Site Characterization and Risk Assessment Report

Formerly Used Defense Site
Nike W-92
Rockville Launch Area
Gaithersburg, Maryland

Prepared For:

City of Gaithersburg
31 South Summit Avenue
Gaithersburg, Maryland 20877

November 06, 2007

ARM Project M07125

ARM Group Inc*
Earth Resource Engineers and Consultants

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1.0 INTRODUCTION

1.1 Purpose and Scope

ARM Group Inc. (ARM), on behalf of the City of Gaithersburg (the City), has prepared the following Site Characterization and Risk Assessment Report to evaluate potential environmental liabilities associated with the Formerly Used Defense Site (FUDS) Nike W-92, Rockville Launch Area (the Site), in Montgomery County, Maryland (FUDS C03MD0245). The City is considering acquiring the 13.71 acre property located at 770 Muddy Branch Road, Gaithersburg, Maryland **(Figure 1)** for use as a community facility and/or park.

The purpose of this assessment is to identify any existing hazardous conditions on the site that may constitute a potential material liability to the City as a new property owner, or that may result in a significant cost in the re-development of the property for the City's proposed future use. The site characterization and risk assessment was performed in accordance with an MDE approved sampling plan which was developed in accordance with protocols established by the Maryland Department of the Environment (MDE) - Voluntary Clean-up Program (VCP).

To complete the site characterization, all identifiable potential sources of environmental contamination were assessed in accordance with the VCP regulations and guidance. ARM performed a Phase I Environmental Site Assessment (ESA), a Phase II ESA and inspected the existing structures for asbestos containing materials (ACMs), lead based paint, mold, PCBs and other potentially hazardous building materials or conditions identified in the Phase I ESA.

The risk assessment evaluates the potential risks to human health and the environment. Following a tiered approach, the MDE Residential Clean-Up Standards and the MDE Groundwater Standards for Type I and Type II Aquifers were used to screen for the contaminants of potential concern (COPC). In addition to site soils and the local groundwater, the potential for risk associated with vapor intrusion into indoor air was considered.

1.2 Historical Data

Several previous investigations have been completed at the subject site, and copies of these investigations were provided to ARM. A summary of these investigations is presented below:

- In September 1986, Woodward-Clyde Consultants (WCC) conducted a Confirmation Study at the site. The results of this study identified the presence of trichloroethene (TCE) in the sample collected from groundwater monitoring well MW-4 at a concentration of 0.021 milligrams per liter (mg/L). In addition, elevated total petroleum hydrocarbons (TPH) (1,100 milligrams per kilogram [mg/kg]) and elevated metals (copper, lead, nickel, zinc, and magnesium) were identified in the soils on the northwest portion of the site. The elevated metals concentrations were attributed to the presence of paint chips and other debris that was noted in the soil sample. The report recommended the removal of three underground storage tanks (USTs) from the site.

- EA Engineering and Science, Inc. (EA) conducted a site investigation on December 27, 1989, which found that the three USTs were removed by the National Institute of Standards and Technology (NIST).

- In 1994 the United States Army Corps of Engineers (USACE), Omaha District, completed a limited groundwater investigation. Results of this investigation identified the presence of TCE in the sample collected from MW-4 at a concentration of 0.017 mg/L.

- On October 31, 2000, the United States Environmental Protection Agency (USEPA), Superfund Technical Assessment and Response Team (START) collected groundwater and soil samples from across the site. Results of this investigation identified the presence of TCE in the sample collected from MW-4 at a concentration of 0.0008 mg/L. However, it was noted that several of the sample bottles contained bubbles and that these bubbles may have been caused by a reaction between the water sample, sediment in the sample, and the sample preservative. The report noted that the detected concentration in the sample collected from MW-4 may not accurately reflect the true concentration of TCE at this monitoring well. Soil samples were also collected from the northwest portion of the site by the USACE as part of this investigation and analyzed for TPH and lead. TPH was not detected in any of the samples, and lead was reported to have been detected within the natural limits for lead in soils in the eastern part of the United States. Furthermore, on of the samples was also analyzed for leachable lead per the toxicity characteristics leaching procedure (TCLP). The results of the TCLP lead analysis indicated that the concentration of leachable lead in the soils was below the current regulatory value of 5 mg/L.

- In September 2002, the USACE Baltimore District collected a groundwater sample from monitoring well MW-4 to confirm that the TCE concentration was below the Maryland Department of the Environment (MDE) Maximum Contaminant Level (MCL) of 0.005 mg/L. The analytical results for this sampling event indicated that no TCE was detected in the sample at or above the laboratory detection limit of 0.0014 mg/L.

2.0 ENVIRONMENTAL SETTING

2.1 Land Use

The subject site consists of an approximately 13-acre, irregular-shaped property located off of Muddy Branch Road in the City of Gaithersburg, Montgomery County, Maryland. The site is currently owned by the National Institute of Standards and Technology (NIST) and is used for testing and storage.

The site is located in an area of mixed land usage. The site is bordered by: undeveloped and residential property to the north; residential and commercial property to the south and west; and Muddy Branch Road followed by residential property to the east.

The local area is supplied by public water, and there are no domestic wells located within a one-half mile radius of the Site. The well survey is included as Appendix A.

2.2 Regional Geology

The site is situated near the eastern edge of the Piedmont Physiographic Province. The soil present in the area includes the Glenelg silt-loam, well drained residual soil derived from severely weathered mica schist. The soil generally contains rock fragments. It is underlain by Precambrian or early Paleozoic metamorphic rocks of the Wissahickon Formation. These rocks which trend northeast to southwest are composed of the Upper Pelitic Schist which was formerly mapped as an albite facies of the Wissahickon Formation. The Upper Pelitic Schist is an albite chlorite muscovite quartz schist with sporadic beds of laminated micaceous quartzite. The primary sedimentary structures include normal bedding graded bedding and soft sediment deformational structures (Woodward Clyde Consultants (WCC) report 1988).

2.3 Hydrogeology

Groundwater is stored and transmitted either through joints and fractures in the rock, or through primary porosity of the severely weathered rock materials. Groundwater is unconfmed with recharge from precipitation. Four monitoring wells were installed by WCC. The wells were designated MW-1, MW-2, MW-3 and MW-4 (Figure 2). WCC's observations were that the weathered bedrock occurred in MW-1 to a depth of 39 feet, and in MW-3 to a depth of 38 feet. Very severely to completely weathered bedrock occurred in both MW-2 and MW-4 to the total depth of 52 and 67 feet respectively. The bedrock consisted of gray weathered mica schist to weathered granitized schist with fractures and occasional quartzite veins in MW-1. A chloritic schist layer and fractures were found in MW-3 with possible shear zones and associated iron staining. Many wells in the area are drilled in the Wassahikon schist. Groundwater flow in the schist is historically controlled by the dip of the foliation plane. The groundwater level probably fluctuates seasonally. Groundwater occurred within the weathered surface soil at a depth of approximately 38 feet below the surface at MW-2 and 50 feet at MW-4. Groundwater occurred in rock at MW-1 at 37 feet below the surface and in MW-3 at 48 feet below the surface at the time of the Confirmation Study. The direction of the shallow groundwater flow at the site is to the northwest. However, if groundwater flow conforms to the topography, a radial pattern of the crest of the hill is possible. Surface water flows north and east from the site toward Lake Halcyon (Army Corps of Engineers, Omaha District report, 1994).

3.0 SITE CHARACTERIZATION

Based on existing information, Areas of Concern (AOC) have been identified on the site **(Figures 2 and** 3). In accordance with our MDE-approved Work Plan dated August 2007, ARM has investigated each AOC to identify impacts to the surface and subsurface soils, and determine if any may present a continuing source of groundwater contamination through the collection of shallow soil samples, and both shallow soil gas and sub-slab soil gas samples. Additionally, ARM has re-sampled the three existing groundwater monitoring wells

Prior to initiating any subsurface investigations, ARM determined the location of utilities in the project area using the Miss Utility system and through NIST personnel. In addition to a current Miss Utility work ticket, ARM utilized a magnetometer and Ground Penetrating Radar to clear each boring location.

All investigation activities were conducted in accordance with a detailed site-specific Health and Safety Plan (HASP) prepared for this project. The HASP was designed to meet the criteria of OSHA 1910.120.

3.1 Soil Investigation

On August 21 and 22, 2007, to confirm the presence or absence of soil contamination and to assess the vertical distribution of any contamination in the vicinity of the AOCs, a 5400 Series Geoprobe Direct Push Unit and the Geoprobe macro-core soil sampling system were used to collect continuous core soil borings at eight locations. The discrete soil samples were collected at depths ranging from one foot to nine feet bgs. The ARM geologist visually inspected and screened the soil cores with a hand-held PID, prior to logging the soil type. Following the VCP's guidance, a shallow sample was collected at the 0 to 1 foot depth interval, and a deeper sample was collected at the 4–5 foot interval. However, if the PID indicated contamination between 5 and 10 feet bgs, the deeper 4-5 foot interval sample was shifted to the depth interval indicated by the PID response. The soil boring logs are included as **Appendix B**, and **Table** 1 below summarizes the soil samples that were submitted for laboratory analysis.

Table 1

Analysis	Number of Soil Samples	Field Duplicate Collected?
VOCs	13	Yes
SVOCs	14	Yes
PPL Metals	12	Yes
Cyanide	12	Yes
PRO	7	Yes
GRO	3	Yes
PCBs	3	Yes
Pesticides/Herbicides	3	Yes

Identified as SB-2 on **Figure 2,** a previously identified AOC that required additional investigation is historical soil sample location D-3 in the northwestern portion of the Site. This AOC was investigated to identify impacts to the surface and subsurface soils. ARM advanced

seven shallow borings in the vicinity of historical soil sample location **D-3** to a depth of four feet bgs. Each soil core was screened with a **PID** and examined for the presence of paint chips, odors and staining in order to estimate the extent of the soil impacts and to choose the location of the planned deeper soil boring (SB-2). The location of SB-2 and the additional borings can be seen on **Figures 4 and 6** and the **PID** responses for each boring are presented in **Table 2.** There was no staining, paint chips or odors observed in any of the borings.

After sampling had been concluded at a location, all down-hole equipment was decontaminated using a mild detergent (Alconox) solution wash, a stiff brush, and potable water rinse.

All boreholes were abandoned in accordance with Maryland abandonment standards as stated in COMAR 26.04.04.**il**.

3.1.1 Soil Conditions: Organic Compounds

All soil samples were submitted to Analytical Laboratory Services, Inc (ALSI) of Middletown, Pennsylvania. The soil samples were analyzed utilizing USEPA SW846 method 8260B for VOCs **(Table 3),** method 8270 for SVOCs **(Table 4),** method 8082 for PCBs **(Table 5),** method 8081 for Pesticides **(Table 6),** method 9056 for Herbicides **(Table 6),** method 8015 for DRO and GRO **(Table** 7). The soil samples submitted for VOC analysis were field preserved by adding five (5) grams of soil into three 40 ml vials with sodium bisulfate (2) and methanol (1). All samples were handled and analyzed according to the USEPA Level III analytical data requirements. The soil sample locations are shown on **Figure** 4 and **Figure 5,** all Tentatively Identified Compounds (TICs) are provided in **Table 8,** and the laboratory reports are included as **Appendix C**.

There were no organic compounds detected above the MDE Residential Clean-Up Standards or the Protection of Groundwater Standards for Soil.

3.1.2 Soil Conditions: Inorganic Constituents

All soil samples were submitted to Analytical Laboratory Services, Inc (ALSI) of Middletown, Pennsylvania. The soil samples were analyzed utilizing method 6020/7471 for Priority Pollutant List (PPL) Metals **(Table 9)** and method 9012A for Cyanide **(Table 7)**. All samples were handled and analyzed according to the USEPA Level III analytical data requirements. The soil sample locations are shown on **Figure 6** and **Figure 7,** the laboratory reports are included as **Appendix C ,**and the inorganic constituents which exceeded the MDE Residential Clean-Up Standards for Soil are summarized below:

- Arsenic exceeded the MDE Residential Clean-Up Standard for Soil of 2,000 ug/kg in all soil samples submitted for analysis.
- Chromium exceeded the MDE Residential Clean-Up Standard for Soil of 23,000 ug/kg in ten of the twelve soil samples submitted for analysis.
- Thallium exceeded the MDE Residential Clean-Up Standard for Soil of 2,000 ug/kg in six of the twelve soil samples submitted for analysis.

3.2 Groundwater Investigation

On July 12, 2007, to confirm the presence or absence of groundwater impacts, existing monitoring wells MW-2, MW-3 and MW-4 **(Figure 8)** were purged and re-sampled using low-flow sampling techniques.

Prior to purging any groundwater, the ARM geologist measured and recorded the depth to water in each of the three (3) wells using a water level indicator. Utilizing a 2-inch Grundfos pump, new polyethylene tubing and a YSI field meter with a flow-through cell, each well was purged until the water quality parameters were stable. Prior to sampling, all required sample containers were labeled and ready for sample collection. Immediately prior to the first vial being filled, the time of sampling was noted and all sample containers for the sample location were assigned the same sampling time. Once the groundwater had stabilized, the groundwater samples were collected into laboratory provided sample containers. The sample containers were filled directly from the discharge tubing without allowing the tubing to touch the rim or the inside of the containers. The groundwater was allowed to flow gently down the inside of the sample containers so that no air bubbles were entrapped. Using a 0.45 micron in-line filter, each groundwater sample collected for metals was field filtered. The groundwater purge logs are included as **Appendix D**.

After sampling was concluded at a location, the tubing was emptied, removed and discarded. The 2-inch Grundfos pump, field meter, flow-through cell and water level indicator were decontaminated using a mild detergent (Alconox) solution wash, and a potable water rinse.

All groundwater samples, along with a Trip Blank, were submitted to ALSI. The samples were analyzed for YOCs **(Table 10)**, SVOCs **(Table 11)**, dissolved PPL Metals **(Table 12)** and Perchlorate **(Table 13)**. Additionally, the groundwater samples collected from MW-4 were also analyzed for TPH-GRO and TPH-DRO **(Table 13)**.

There were no detections above the laboratory reporting limit for VOCs, SVOCs, PPL Metals or Perchlorate in monitoring wells MW-2 and MW-3. Monitoring well MW-4 did not have any detections above the laboratory reporting limit for VOCs, SVOCs, Perchlorate, TPH-GRO or TPH-DRO. The only detection in MW-4 was zinc at a concentration of 0.04 mg/L, which is well below the MDE Cleanup Standard for groundwater of 1.1 mg/L. The laboratory reports are included as **Appendix C.**

As the results of the groundwater sampling and analysis indicated that there is no impact to the groundwater beneath the former Nike W-92 site, the United States Army Corps of Engineers abandoned monitoring wells MW-2, MW-3 and MW-4.

3.3 Soil Gas Investigation

On August 21, 2007, utilizing the MDE-VCP protocols, ARM collected five soil gas samples across the site at a depth of ten feet bgs, three samples at a depth of four feet bgs and two samples from beneath the slab of existing buildings at a depth of one (1) foot below the slab **(Figure 9 and 10)**. The soil gas samples targeted at the AOCs to detect unidentified impacts, along the perimeter to detect vapor migration to adjacent residential properties, and to assess the potential for vapor intrusion.

To install the eight temporary soil gas monitoring points across the site, the Geoprobe was utilized to create the ten foot and four foot boreholes. Once the borehole has been completed to the appropriate depth, a six inch soil gas implant constructed of double woven stainless steel wire screen was attached to the appropriate length of tubing and lowered through the borehole. Once the implant and tubing were installed, the tubing was capped, and sand was added to create a permeable layer around the implant. After a sufficient amount of sand had been added, such that it extended approximately two feet above the implant, bentonite was added and hydrated to create a seal above the implant.

To install the two temporary sub-slab soil gas monitoring points beneath the slab of the existing buildings, a hammer-drill was used to create a pilot hole 1.5 inches in diameter that extended through the concrete floor to a depth of one foot below the concrete slab. A six inch soil gas implant, constructed of double woven stainless steel wire screen, was attached to the appropriate length of tubing and lowered through the borehole. Once the implant and tubing had been installed, the tubing was be capped, and sand added to create a permeable layer around the implant. After a sufficient amount of sand was added, such that it extended about six above the implant, bentonite was added and hydrated to create a seal above the implant at the surface.

The soil gas samples were collected using evacuated stainless steel canisters (summa canisters) supplied by ALSI. The intake of each summa canister was regulated with a flow restrictor set for an intake time greater than eight (8) hours. At the completion of the sampling period, the probes were removed, the borehole filled, and the surface repaired.

The soil gas samples were submitted to ALSI for analysis. All samples were handled and analyzed according to the USEPA Level III analytical data requirements. Utilizing USEPA Method TO-15, the soil gas samples were analyzed for VOCs **(Table 14)**. The laboratory reports are included as **Appendix C.**

As seen on **Table 14**, there were several VOCs detected in soil gas across the site; however, only three soil gas samples had VOCs which exceeded the USEPA Vapor Intrusion Guidance Criteria for residential land use for a lifetime cancer risk of $1x10^{-5}$. The VOCs which exceeded the EPA Vapor Intrusion Guidance Criteria are summarized below:

- TCE exceeded the EPA Vapor Intrusion Guidance Criteria of 2.2 ug/m^3 in samples SG-5 (4.9 ug/m^3), SG-8 (115 ug/m^3) and SG-11 (8.9 ug/m^3)
- Chloroform exceeded the EPA Vapor Intrusion Guidance Criteria of 11 ug/m^3 in sample SG-8 (14.5 ug/m^3).

It should be noted that sample SG-5 and SG-11 were collected from beneath the concrete slab of existing buildings and SG-8 was collected from beneath a paved surface adjacent to a building. The low levels of VOCs detected beneath the paving may be indicative of trapped vapors. None of the soil gas samples collected away from the buildings showed any exceedances.

3.4 Quality Assurance/Quality Control

The Quality Assurance/Quality Control (QA/QC) protocols established as part of the MDE's VCP program were incorporated throughout the VCP site investigation. During the investigation ARM collected blind field duplicates for soil and groundwater analysis performed. A trip blank, analyzed for VOCs, was also submitted along with the samples. All samples submitted to the laboratory for analyses were accompanied by a Chain of Custody (CoC) form, and the cooler temperature was measured and documented by the laboratory upon receipt. The QA/QC documentation can be found within the laboratory data package following this report as part of **Appendix C**.

No irregularities were found within the QA/QC results; however, some VOCs were detected in the soil gas samples uniformly across the site. In an attempt to determine the possible source of the VOCs that were detected uniformly across the Site, ARM engaged the laboratory to perform an internal review of the soil gas data and associated QA/QC. In addition to the internal review by the laboratory, ARM submitted a length of tubing from the same roll as the tubing that was used on Site to collect the soil gas samples. The laboratory collected and analyzed a blank sample using the tubing supplied by ARM. Many of the compounds detected uniformly across the Site were also detected in the blank sample run by the laboratory. While some of the compounds are common laboratory contaminants, it does appear as though the tubing was the source of several of the detected compounds. As such, the following compounds are suspected to be biased high as they were detected in each of the soil gas samples submitted for analysis and the laboratory blank:

- Acetone
- 2-Butanone
- Hexane
- Tetrahydrofuran
- Toluene

Detections of these compounds in soil gas have been flagged with a B qualifier on **Table 14**.

4.0 BUILDING MATERIAL INSPECTION

As part of the site characterization and risk assessment, ARM has completed an asbestos-containing material (ACM) inspection, limited lead-based paint (LBP) inspection, limited fungal (mold) inspection, and hydraulic oil / PCB / other hazardous materials inspection of the Site. The purpose of this work was to gather information to be used by City of Gaithersburg as part of their redevelopment of this property.

ARM completed the following activities:

- An asbestos containing material (ACM) inspection, which included the collection of samples from suspect materials for laboratory analysis;
- A limited lead based paint (LBP) inspection, which included the use of colorimetric paint swabs to determine if the lead content of the painted surfaces;
- A limited fungal (mold) inspection; and
- A hydraulic oil / polychlorinated biphenyl (PCB) / other hazardous materials inspection.

4.1 Asbestos Containing Material Inspection

The ACM inspection was completed in accordance with the protocols established by the Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (USEPA) and the Maryland Department of the Environment (MDE). The purpose of the inspection was to determine if ACMs are present within the on-site structures that are to be razed or remodeled as part of the site redevelopment. Mr. Mark J. Heisey of ARM, a MDE-accredited Building Inspector, conducted the inspection. The inspection consisted of a building walk-through to visually/tactilely inspect for the presence of building materials suspected of containing asbestos, and the subsequent collection of select samples of the suspect homogeneous materials. The buildings that were inspected are shown on **Figure 11** and **Figure 12.**

During the inspection, suspect ACMs that were observed included:

- joint compound;
- roofing materials (bungalows only);
- 9x9 floor tile and mastics;
- wall board debris;
- ceiling tile;
- 12x12 floor tile and mastic; and
- sprayed on fireproofing.

ARM collected samples of each of these materials for laboratory analysis. The samples were submitted to EMSL Analytical, Inc. (EMSL) in Plymouth Meeting, Pennsylvania. EMSL maintains the following accreditations/certifications:

- Participation in the USEPA Quality Assurance Program/accreditation under the American Industrial Hygiene Association (AIHA) National Voluntary Laboratory Accreditation Program (NVLAP Certification Number 101048-0) for asbestos bulk fiber analysis by Polarized Light Microscopy (PLM); and

All sampling was conducted in accordance with the current OSHA General Industry requirements to rebut the presumption of asbestos (29CFR1910.1001); the USEPA inspection requirements for ACM under the Asbestos Hazard Emergency Response Act (AHERA) (40CFR763). The samples were analyzed by PLM in accordance with USEPA Method 600/R-93/116. Random sample locations were used for thermal system insulation and surfacing materials where multiple samples were collected of each homogenous material.

The USEPA defines an "asbestos containing building material" as any building material that contains greater than one percent of any type of asbestos (40 CFR Part 763.83). The analytical results for the sampled suspect ACMs are summarized in **Table 15** and the laboratory reports are provided as **Appendix C**.

Friability of each area was assessed in accordance with 40CFR Part 763, by the Building Inspector at the time of the inspection. Friable materials can be crumbled, pulverized, or reduced to powder, by hand pressure when dry.

As identified in **Table 15**, the following non-friable materials are ACMs:

- 250 square feet (sf) of white 9x9 floor tile and the associated mastic located in the Missile Assembly Building;
- 250 sf of green 9x9 floor tile and the associated mastic located in the Missile Assembly Building;
- 500 sf of black 9x9 floor tile and the associated mastic located in the Generator Building; and
- 1,000 sf of black 9x9 floor tile and the associated mastic located in the Shower/Other Building to the rear of the barracks was suspected to be an ACM. As such, a sample was collected for analysis. The sample however was not received by the laboratory and is presumed to have been lost. As the material was a suspected ACM, and no analysis was performed, it is considered a Presumed Asbestos Containing Material (PACM).

The ACM inspection conducted by ARM was performed to identify accessible suspect ACMs. ARM performed this survey only on materials in readily accessible and visible areas. ARM's selection of sample locations and frequency is based on our observations and the assumption that like materials in the same area were homogeneous. Additional sampling could be warranted in the future if new or differing materials or conditions are encountered.

4.2 Limited Lead Based Paint (LBP) Inspection

The purpose of the limited LBP inspection was to determine if LBP is present in and/or on the on-site buildings. Based upon the age of the majority of the on-site buildings (pre-1978) LBP was suspected. The limited LBP inspection included a visual inspection of the on-site buildings **(Figure 11 and Figure 12)** to identify interior / exterior building surfaces that are suspected to

have been painted with LBP, and the use of colorimetric paint swabs to determine if the paint is a LBP.

Results of the limited LBP inspection indicated that the yellow paint on the lifts within Silo 1 and Silo 2 was LBP, the dark green paint in the missile assembly building was LBP, the white paint in the generator building was LBP, the dark blue paint in the barracks was LBP, and the green paint in the building to the rear of the barracks was LBP. In addition, the results of the paint swabs collected from the kennels were inconclusive; therefore, this paint is considered to be LBP.

4.3 Limited Fungal (Mold) Inspection

The limited fungal (mold) inspection was completed in accordance with the protocols established by the New York City Department of Health, which recommends visual inspections only, unless extenuating circumstances dictate otherwise. The inspection included a visual inspection of readily accessible interior locations of the on-site buildings for water staining, standing water, and/or water-saturated building materials, and visual fungal growth.

Fungal (mold) growth was observed on the ceiling of Bungalows 2 and 4, and throughout the Missile Assembly Building **(Figure 11 and Figure 12)**. Water damaged materials were observed in the kennels, the small building to the rear of the barracks, and the generator building. The mold conditions should be corrected if any of these buildings are expected to be occupied. These materials are not subject to special handling or disposal requirements if the buildings are to be razed. However, contractors completing the demolition activities should be made aware of the potential presence of mold within these buildings.

4.4 Hydraulic Oil / PCB / Other Hazardous Materials Inspection

During the Phase I ESA site inspection, hydraulic pumps and lifts were identified in each of the three silos **(Figure 11 and Figure 12)**. During the building materials inspection, it was confirmed that hydraulic oil still remains in each of the three hydraulic systems. Each of the hydraulic reservoirs was accessed and samples of the hydraulic oil were submitted to ALSI to determine if it is PCB-containing. In addition to collecting a sample of the oil from each of the reservoirs, a wipe sample was collected from the floor in the vicinity of the hydraulic systems. As seen on **Table 16**, there were no PCBs detected in the hydraulic oil collected from the reservoirs; however, the wipe sample collected from the floor in Silo 2 yielded a concentration of Aroclor-1242 of 7.2 ug/wipe. This could be indicative of the historical use of PCB containing oils. As the concrete floor was in good condition with no apparent cracks, it is not anticipated that the soils below the silo have been impacted by PCBs.

During the Phase I ESA site inspection ARM observed standing water in each of the missile holds in each silo. It was ARM's intent to measure the depth of any water and sediment accumulated in the missile holds and collect grab samples of the standing water and any accumulated sediment observed in each of the missile holds for analysis of VOCs, DRO and PCBs. During the building materials inspection, there was no standing water in the missile holds and only a minimal amount of accumulated sediments; however, yellow paint chips, confirmed to be LBP, were observed.

During the building materials inspection, the following additional observations were made:

- Thermostats containing mercury were observed in Bungalows 2 through 7 and the missile assembly building. These thermostats should be removed and disposed of prior to any renovation / demolition activities.
- Nine 55-gallon drums and two 5-gallon containers were observed in the generator building. The 55-gallon drums included two that were labeled as "non-PCB containing waste", two that were empty, and five that were labeled as "lubricating oil". The two 5-gallon containers were labeled as "petrolethem". These drums should be removed and disposed of by NIST prior to the property transfer or by the City prior to any renovation / demolition activities.
- Consumer end packaged paints, solvents, oils, and greases were observed within many of the onsite buildings. These materials should be removed and disposed of by NIST prior to the property transfer or by the City prior to any renovation / demolition activities.
- ARM inspected the majority (i.e. approximately 70%) of the fluorescent light ballasts located within the on-site buildings. All of the ballasts that were inspected were labeled as "no PCBs".

5.0 HUMAN HEALTH RISK ASSESSMENT

ARM has prepared this human health assessment to evaluate potential human exposures for the current commercial site use and for a future residential land-use scenario. This assessment was prepared in accordance with guidelines published by the Maryland Department of the Environment (MDE) titled "Voluntary Cleanup Program Guidance Document" (MDE, 2005). The human health assessment includes comparing the analytical data from the Site against the MDE's Generic Numeric Clean-Up Standards for Groundwater and Soil under a residential land use scenario, identifying the potential receptor populations for the future land use and evaluating all appropriate exposure pathways.

5.1 Human Health Assessment

To assess the potential exposures and health risks associated with soil, groundwater and soil gas at the Site, the available data was evaluated. The exposure assessment identified potential receptor populations and pathways of exposure under the current commercial land use and the anticipated future residential use of the property for residential land use. Tables 1 through 14 summarize the soil, groundwater, and soil gas analytical data, respectively. Factors considered for the exposure assessment include the following site-specific information.

- The Site is currently used by NIST; however, the planned future use of the Site is a community facility and/or park.
- There were no detections in groundwater above the MDE Cleanup Standards for groundwater.
- According to the MDE well search, there are no potable wells within a one half mile radius of the Site; the well search results can be found in Appendix A. Additionally, due to the availability of public water, and extensive development that has already occurred in the area, the Site groundwater is considered a non-use aquifer.
- There were detections of metals (arsenic, chromium and thallium) above the MDE Residential Clean-Up Standard for soil. These detections indicate a possible exposure risk.
- There were detections of TCE and chloroform above the EPA Vapor Intrusion Guidance Criteria for residential land use. These detections indicate a possible inhalation risk.

Table 17 identifies the viable receptors and exposure pathways evaluated in the risk assessment, and it also provides site-specific factors that influence potential factors. As indicated in Table 17, the potential exposures of concern under the future recreational use are limited to construction worker, commercial worker and visitor population’s exposure to soil, and vapors.

5.2 Summary of Risk

The exposure assessment identified potential receptor populations and pathways of exposure for the anticipated future recreational use of the property. As there were no remaining impacts to groundwater, only soil and soil vapor were retained for further evaluation.

5.2.1 Soil

As the anticipated future use of the site is a community facility and/or park, direct contact with or incidental ingestion of exposed soil is a possibility. A total of twelve soil samples were collected from six locations across the site.

- There were no organic compounds detected above the MDE Residential Clean-Up Standards or the Protection of Groundwater Standards for Soil.
- Three of the PPL Metals exceeded the MDE Residential Clean-Up Standards for soil; Arsenic, Chromium and Thallium.

The MDE performed a statistical analysis on background soil data collected from environmental investigations across the state to develop Anticipated Typical Concentrations (ATC) for soil in Western Maryland, Central Maryland and Eastern Maryland. The ATC is the mean concentration plus one standard deviation, and represents a value that is greater than or equal to the majority of the background concentration samples.

While some Arsenic, Chromium and Thallium results exceed the MDE Residential Clean-Up Standards for soil, they are comparable to background concentrations found throughout the state.

- The ATC for Arsenic in Central Maryland is 4,900 ug/kg, and the average concentration of Arsenic on the Site is 4,692 ug/kg. The highest concentration of Arsenic used by the MDE in the development of the ATC was 6,700, and the highest concentration of Arsenic observed on the site was 6,000 ug/kg. Additionally, in 1984 the United States Geologic Survey (USGS) reported an average concentration of 7,200 ug/kg of Arsenic in Maryland.
- The ATC for Chromium in Central Maryland is 30,000 ug/kg. The highest concentration of Arsenic observed on the site was 29,600 ug/kg. Additionally, in 1984 the United States Geologic Survey (USGS) reported an average concentration of 54,000 ug/kg of Chromium in Maryland.
- While there was no ATC reported for Thallium in Central Maryland, the ATC for Thallium in Western Maryland was 4,500 ug/kg. The highest concentration of Thallium observed on the site was 4,000 ug/kg. Additionally, in 1984 the United States Geologic Survey (USGS) reported an average concentration of 9,400 ug/kg of Thallium in Maryland.

As such, the observed levels of Arsenic, Chromium and Thallium in soil do not represent a significant risk.

5.2.2 Soil Gas

The soil gas samples targeted at the AOCs to detect unidentified impacts, along the perimeter to detect vapor migration to adjacent residential properties, and to assess the potential for vapor intrusion.

There were several VOCs detected in soil gas across the site; however, only three soil gas samples had VOCs which exceeded the USEPA Vapor Intrusion Guidance Criteria for residential land use for a lifetime cancer risk of $1x10^{-5}$. The VOCs which exceeded the EPA Vapor Intrusion Guidance Criteria are TCE (SG-5, SG-8, SG-11) and Chloroform (SG-8).

As samples SG-5 and SG-11 were collected from beneath the concrete slab of existing buildings and SG-8 was collected from beneath a paved surface, it appears that the elevated concentrations are due to the accumulation of vapors below the buildings and asphalt paving. The data suggests that releases to the subsurface beneath the former machine shop and barracks, and in the vicinity of the propellant handling building may have occurred. The low concentrations indicate that any remaining impacts are minimal.

Based on the comparison to the EPA guidance, the accumulated vapors beneath the existing buildings and paved area could represent an unacceptable risk under the future recreational land use scenario via vapor intrusion to indoor air if the existing buildings are not demolished or if new buildings are constructed within the footprint of the potentially impacted areas where the elevated vapor concentrations were observed.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase I ESA and Phase II ESA conducted by ARM have defined the nature and extent of impacts identified at the Former Nike Missile Site W-92. These investigations have adequately characterized the site conditions to support the completion of a risk assessment to identify specific potential exposures that should be addressed to ensure that there are no potentially unacceptable risks presented by the potential future recreational use of the property.

While previous investigations documented concentrations of TCE above the MCL in groundwater beneath the site, ARM has re-sampled the three existing groundwater monitoring wells, the results of the groundwater sampling and analysis indicated that there is no longer any impact to the groundwater beneath the former Nike W-92 site.

Based on the observed concentrations in the soil gas samples, the accumulated vapors beneath the existing buildings and paved area could represent an unacceptable risk under the future recreational land use scenario via vapor intrusion to indoor air if the existing buildings are not demolished or if new buildings are constructed within the footprint of the potentially impacted areas where the elevated vapor concentrations were observed. It is ARM's recommendation that a sub-slab venting system be installed and operated if these existing buildings are to be used. If new buildings are constructed in the same location, a vapor barrier beneath the new building should be incorporated into the construction.

While Arsenic, Chromium and Thallium do exceed the MDE Residential Clean-Up Standards for soil, they are comparable to background concentrations found throughout the state. As such, the observed levels in soil do not represent a significant risk.

ARM provides the following conclusions and recommendations as it pertains to the Building Materials Inspection:

- The ACM Inspection identified approximately 2,000 sf of resilient floor covering (9x9 floor tile) and associated mastic. These materials included: 250 sf of white 9x9 floor tile and the associated mastic located in the missile assembly building; 250 sf of green 9x9 floor tile and the associated mastic located in the missile assembly building; 500 sf of black 9x9 floor tile and the associated mastic located in the generator building; and 1,000 sf of black 9x9 floor tile and the associated mastic located in the building to the rear of the barracks. Per the USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR part 61, Subpart M) these materials are considered to be Category I Non-Friable ACMs. Category I materials that are not friable prior to demolition may be left in place during demolition as long as the demolition practices will not render these materials friable. However, these materials may need to be segregated from the waste stream prior to disposal.

- Laboratory analysis of the samples collected from the sprayed on fireproofing that is located in Silo 3 indicated that this material was not an ACM. According to the laboratory analysis, this material consists of 10% cellulose and 90% of a non-fibrous material. In addition, NIST personnel reported that this material was previously sampled and their results also indicated that this material is not an ACM. However, labels on the door to this silo and the material itself indicate that it is an ACM. Based on the

laboratory analysis of the samples collected by ARM, abatement of this material prior to demolition activities is not required. However, due to the presence of the labels indicating that this material is an ACM, ARM recommends that the results of the previous asbestos inspection be reviewed.

- Surfaces within many of the on-site buildings were determined to be painted with LBP. Since the on-site buildings are not "child occupied facilities" as defined by the USEPA in 40 CFR 745, and are intended to be razed, abatement of the LBP is not required. However, the disposal of demolition waste could be subject to specific disposal restrictions. Specifically, waste characterization via the Toxicity Characteristic Leaching Procedure (TCLP) may be required. In addition, contractors completing demolition activities should be made aware of the potential presence of LBP and are required to comply with the OSHA Lead in Construction regulations (29CFR1926.62) including pre-job medical surveillance, respiratory protection for uncharacterized, manual demolition, etc.

- Fungal (mold) growth was observed on the ceiling of Bungalows 2 and 4, and throughout the Missile Assembly Building. Water damaged materials were observed in the kennels, the small building to the rear of the barracks, and the generator building. These materials are not subject to special handling or disposal requirements if the buildings are to be razed. However, contractors completing the demolition activities should be made aware of the potential presence of mold within these buildings.

- Thermostats containing mercury were observed in Bungalows 2 through 7 and the missile assembly building. These thermostats should be removed and disposed of prior to any renovation / demolition activities.

- Nine 55-gallon drums and two 5-gallon containers were observed in the generator building. The 55-gallon drums included 2 that were labeled as "non-PCB containing waste", two that were empty, and five that were labeled as "lubricating oil". The two 5-gallon containers were labeled as "petrolethem". These drums should be removed and disposed of prior to any renovation / demolition activities.

- Consumer end packaged paints, solvents, oils, and greases were observed within many of the onsite buildings. These materials should be removed and disposed of prior to any renovation / demolition activities.

FIGURES

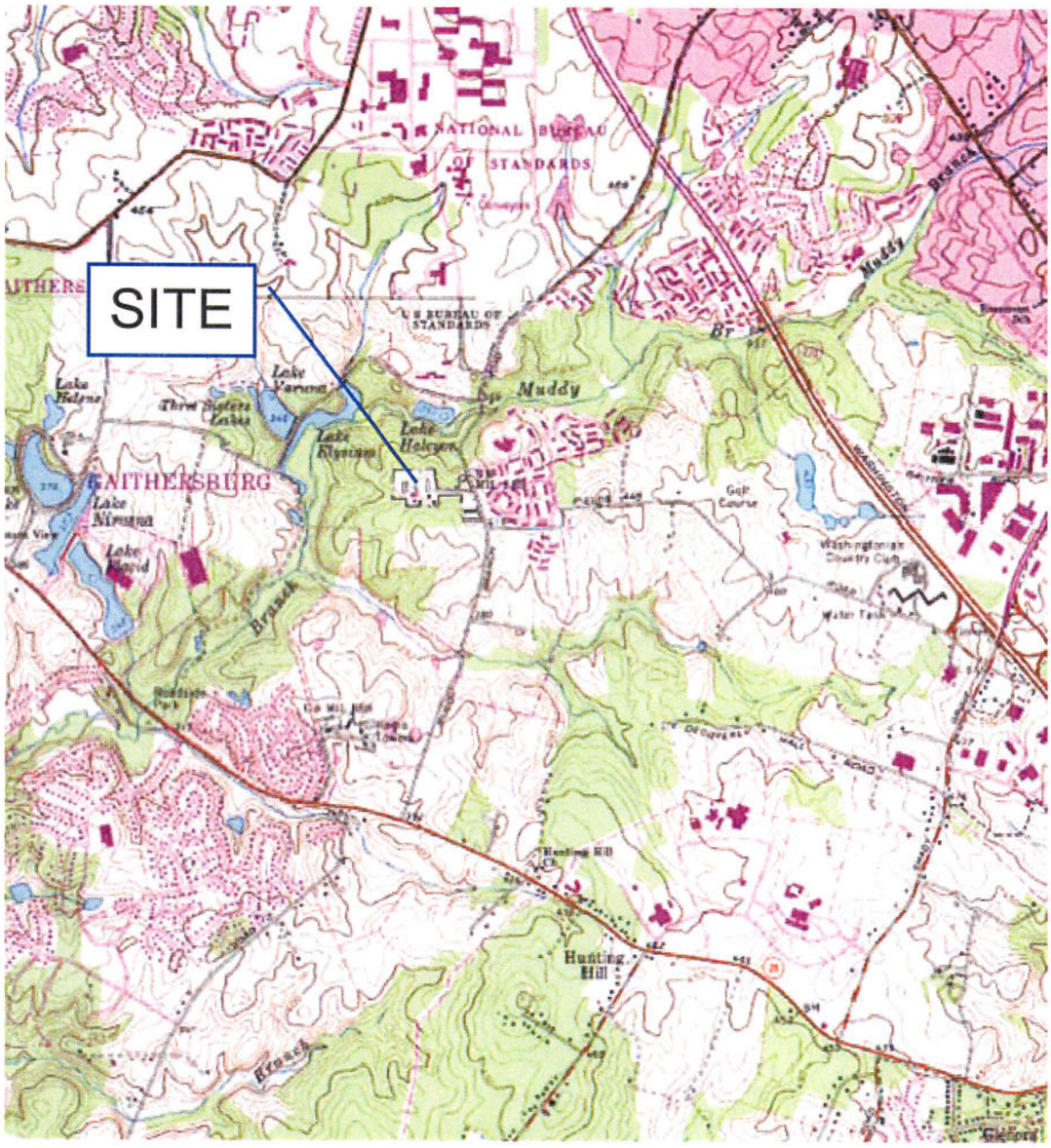

Figure 1

Site Location Plan
Former Nike W-42 Rockville Launch Area Gaithersburg, MD
October 2007
M07125

USGS: Rockville Quadrangle
Maryland - Virginia
Photo-Revised 1984

N

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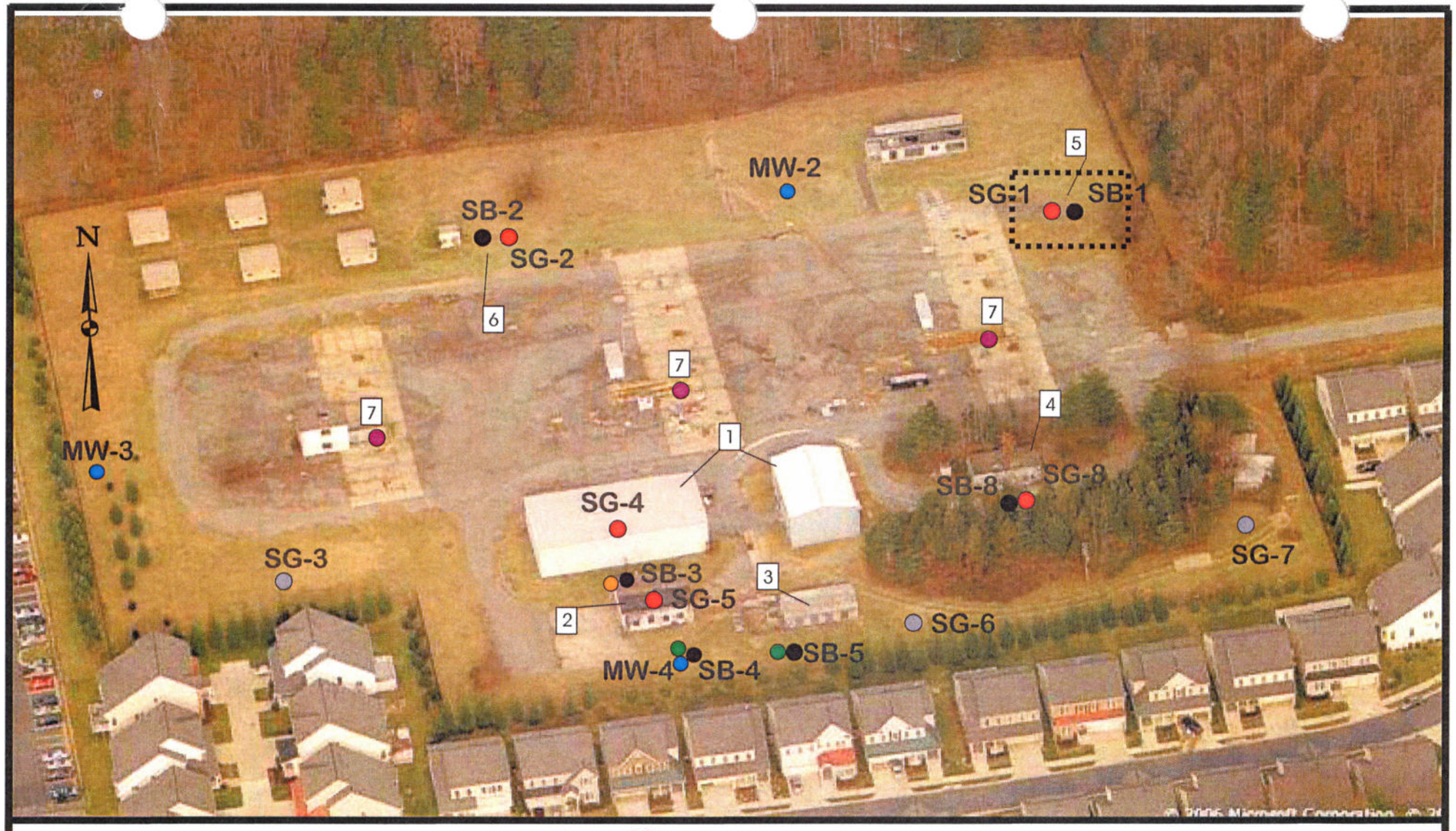
Earth Resource Engineers and Consultants
5850 Symphony Woods Road • Suite 120
Columbia, MD • Phone: (410) 740-0046



- Existing Monitoring Well
- Location of AST
- Location of Former UST
- Soil Sample
- Shallow or Sub-Slab Soil Gas Sample
- Deep Soil Gas Samples
- Sediment and Water Samples

Areas of Concern

1) Storage Buildings
2) Machine Shop / Former Missile Assembly
3) Sub-Station / Former Generator building
4) Propellant Handling Building
5) Former Burn Tower
6) Previous sample location D-3
7) Missile Silos

Figure 2

Areas of Concern Locations

Former Nike Battery W-92
Gaithersburg, MD

October 2007

M07125

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- Location of AST
- Location of Former UST
- Soil Sample
- Sub-Slab Soil Gas Sample
- Deep Soil Gas Sample

N

Figure 3

Areas of Concern Locations

Former Nike Battery W-92
Gaithersburg, MD

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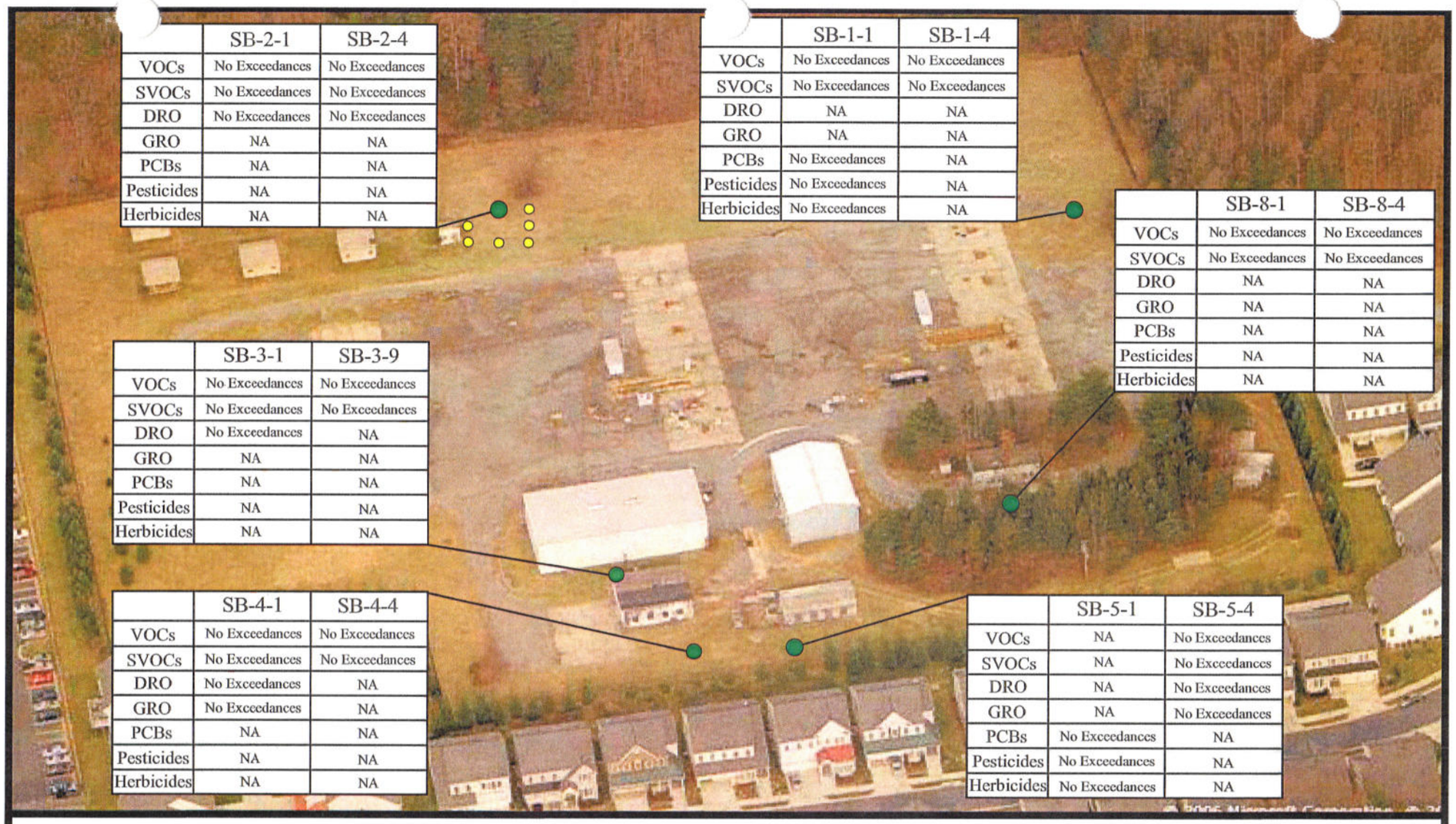

Soil Sample Location

Shallow Soil Boring Location for Screening

NA indicates the sample was not run for listed parameter

Soil Sample Results in ug/kg

0 150 300

APPROXIMATE SCALE IN FEET

N

Figure 4

Soil Sample Locations - Organic Compounds

Former Nike Battery W-92
Gaithersburg, MD

October 2007

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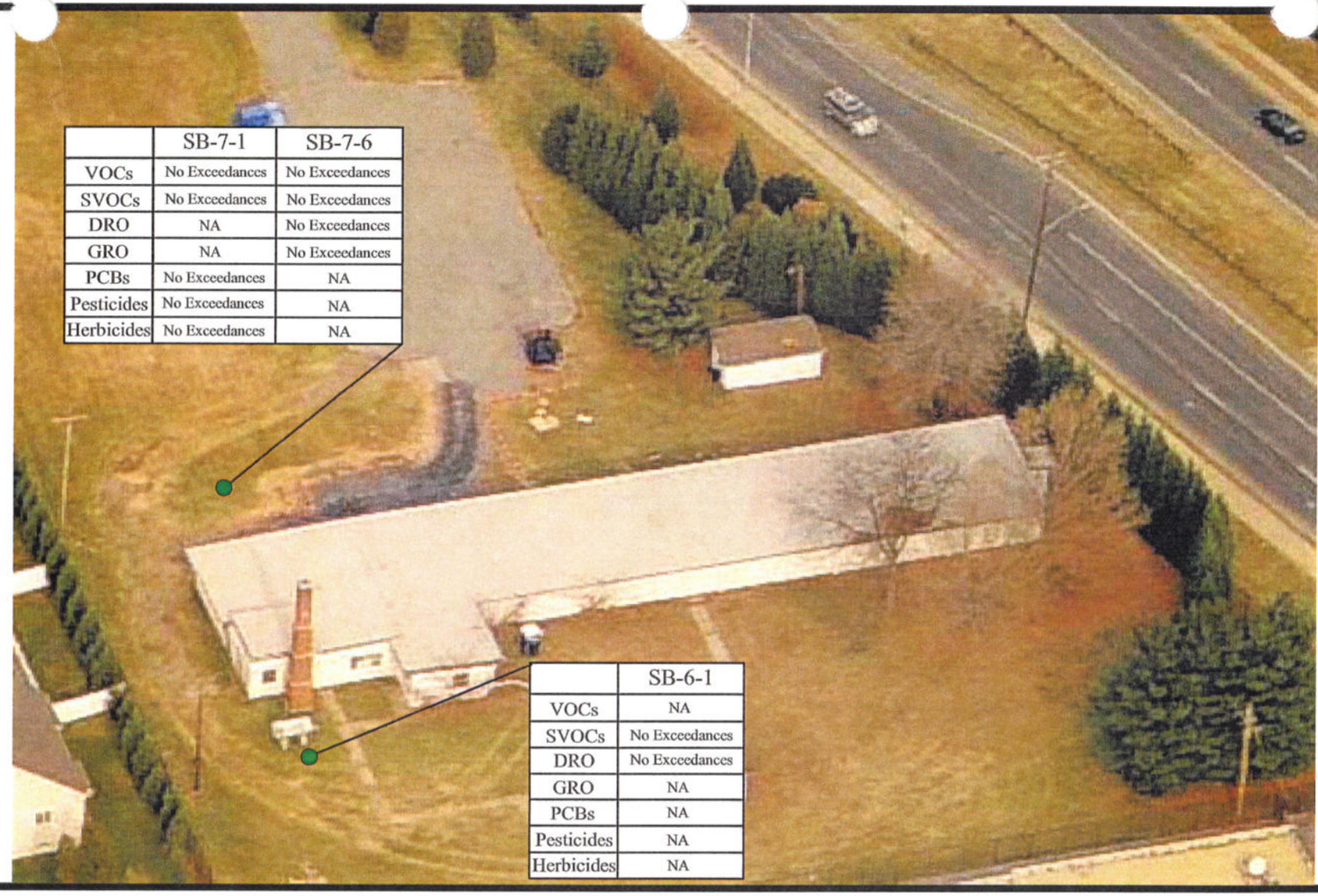

Figure 5

Soil Sample Locations - Organic Compounds

Former Nike Battery W-92
Gaithersburg, MD

● Soil Sample Location

Soil Sample Results in ug/kg

NA indicates the sample was not run for listed parameter

0 75 150

APPROXIMATE SCALE IN FEET

N

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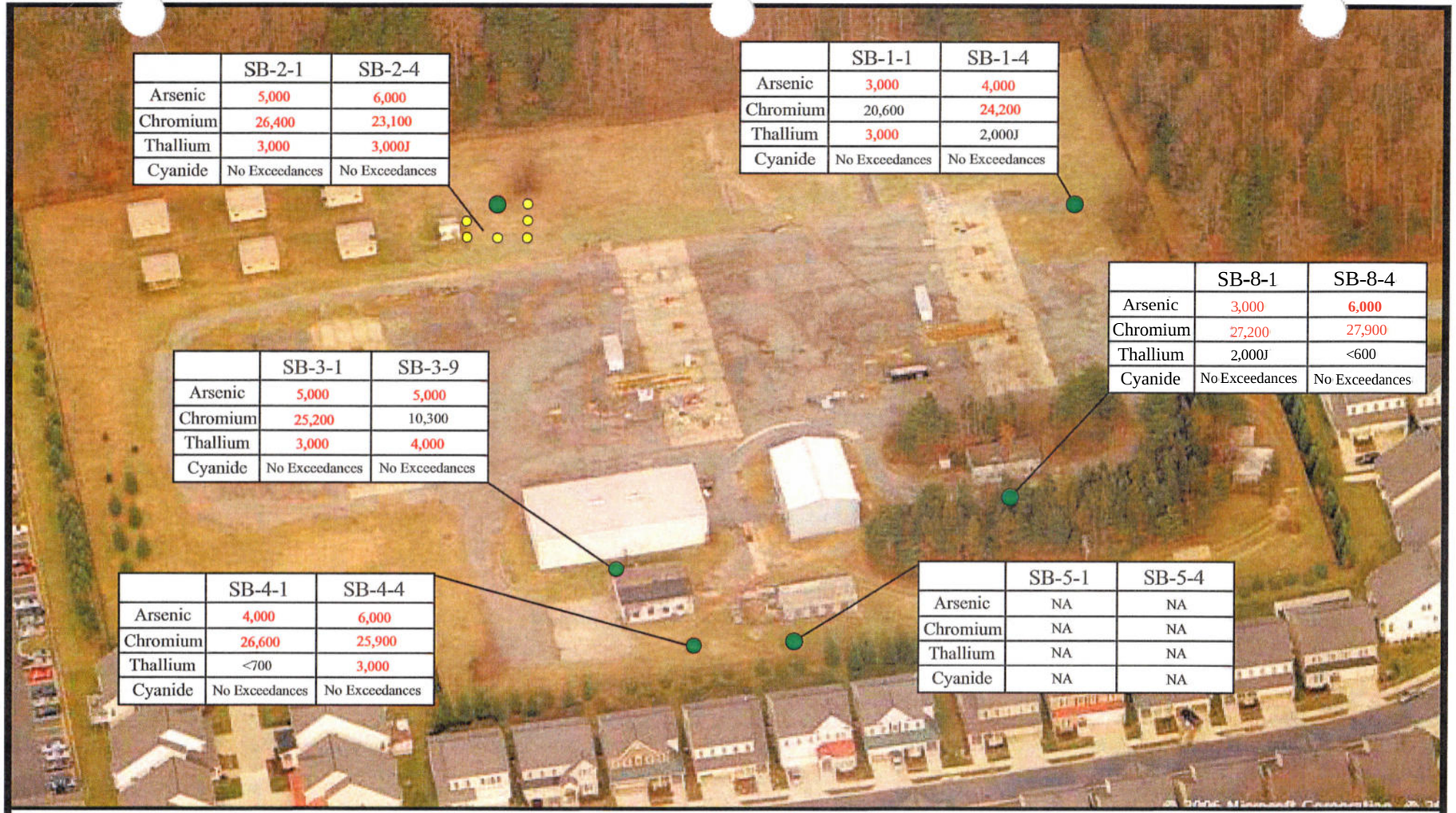

● Soil Sample Location

o Shallow Soil Boring Location for Screening

Soil Sample Results in ug/kg

NA indicates sample not run for these parameters

Results provided for only those compounds with at least one exceedance of a MDE Clean-Up Standard

Values in Red Indicate an Exceedance of the MDE Residential Clean-up Standard for Soil

0 150 300

APPROXIMATE SCALE IN FEET

N

Figure 6

Soil Sample Locations - Inorganic Constituents

Former Nike Battery W-92
Gaithersburg, MD

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● Soil Sample Location

Soil Sample Results in ug/kg

NA indicates sample not run for these parameters

Results provided for only those compounds with at least one exceedance of a MDE Clean-Up Standard

Values in Red Indicate an Exceedance of the MDE Residential Clean-up Standard for Soil

0 75 150

APPROXIMATE SCALE IN FEET

N

Figure 7

Soil Sample Locations - Inorganic Constituents

Former Nike Battery W-92
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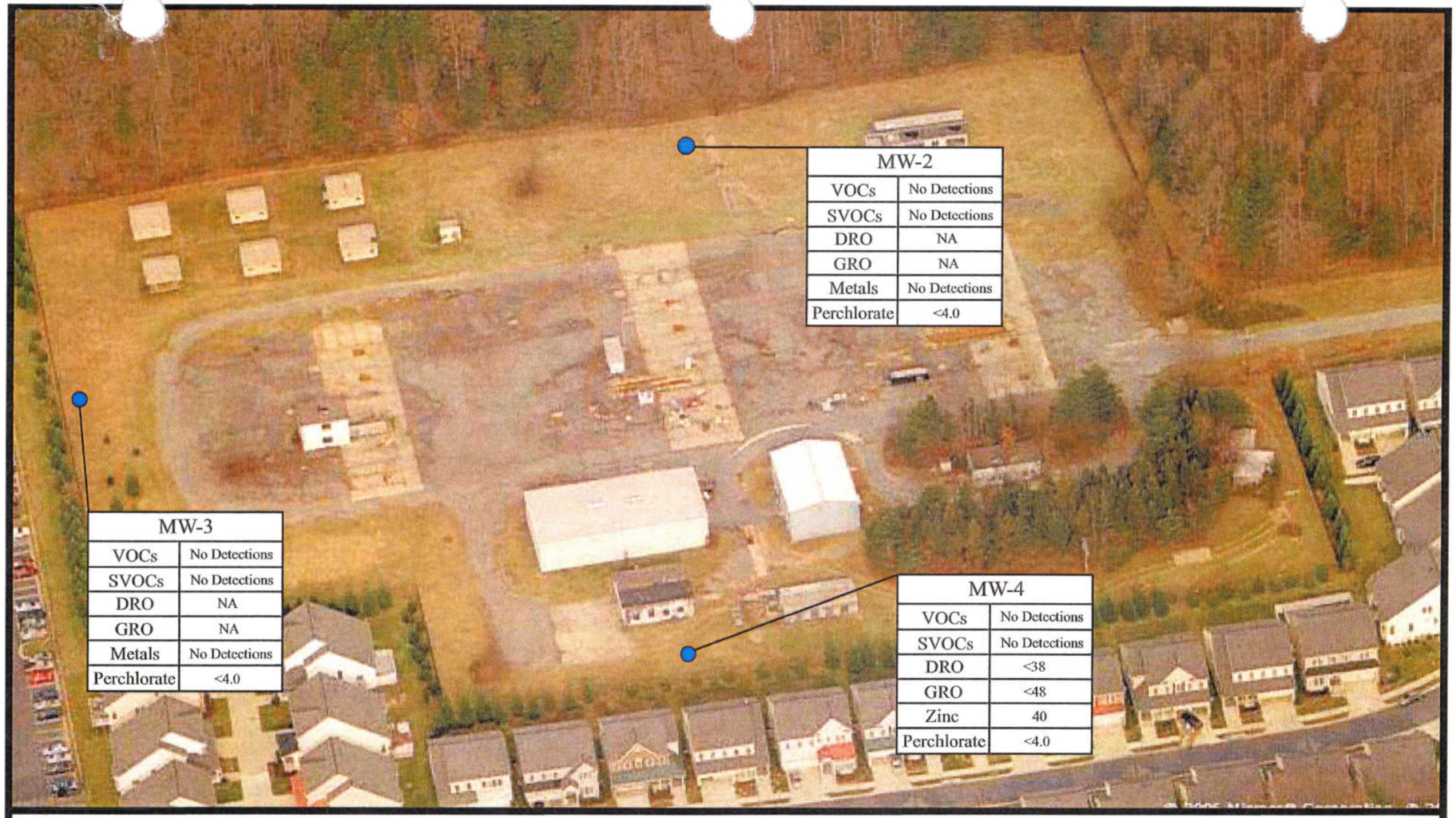

Figure 8

Groundwater Sample Locations

Former Nike Battery W-92
Gaithersburg, MD

● Groundwater Sample Location

Groundwater Sample Results in ug/L

NA indicates the sample was not run for listed parameter

0 150 300

APPROXIMATE SCALE IN FEET

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Figure 9

Soil Gas Sample Locations

Former Nike Battery W-92
Gaithersburg, MD

- Shallow (4' bgs) or Sub-Slab Soil Gas Sample
- Deep (10' bgs) Soil Gas Samples

Soil Gas Sample Results in ug/m^3

Values in Red Indicate an Exceedance of the EPA Vapor Intrusion Guidance Criteria for shallow soil gas

0 150 300

APPROXIMATE SCALE IN FEET

N

October 2007

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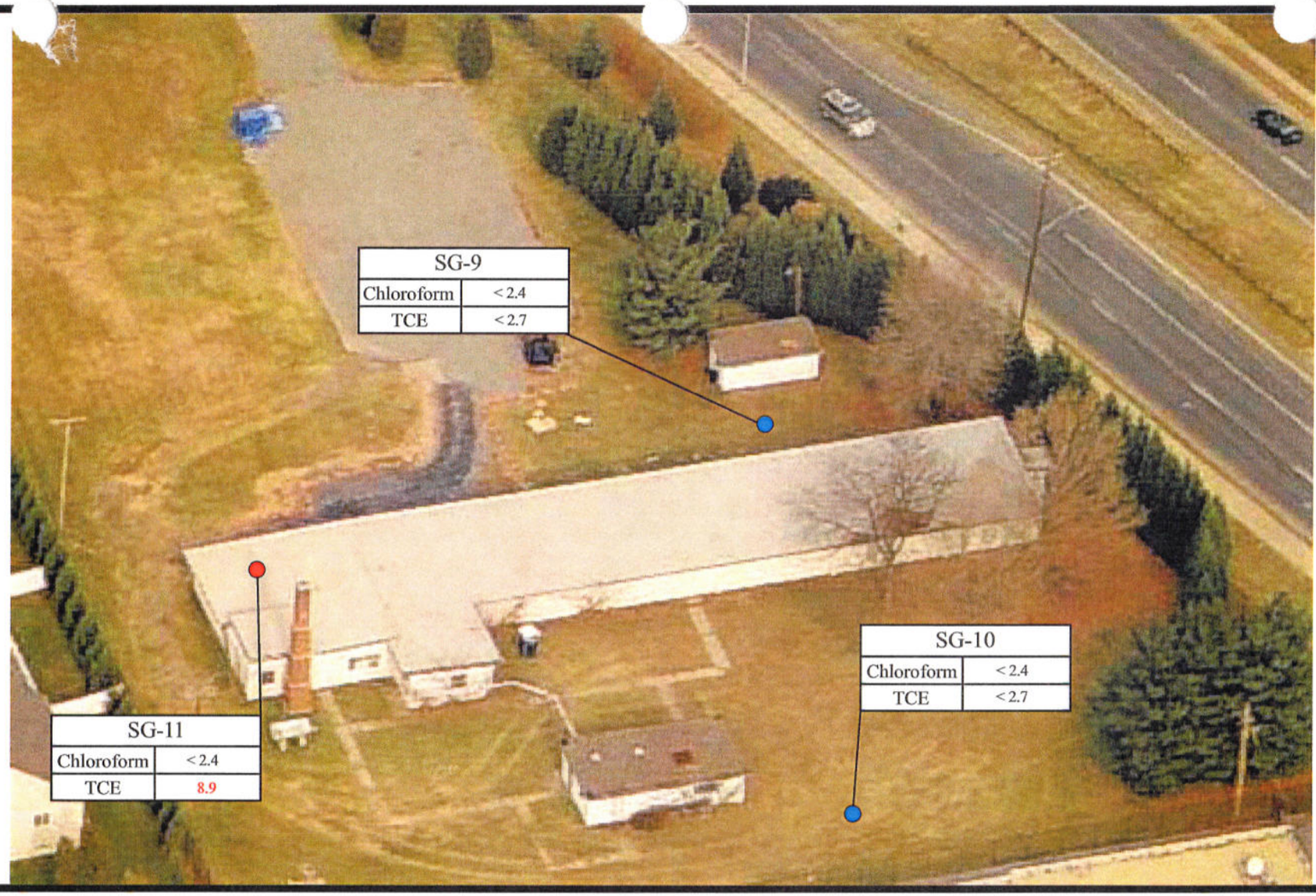

Figure 10

- Shallow (4' bgs) or Sub-Slab Soil Gas Sample
- Deep (10' bgs) Soil Gas Samples

Soil Gas Sample Results in ug/m^3

Values in Red Indicate an Exceedance of the EPA Vapor Intrusion Guidance Criteria for shallow soil gas

0 75 150

APPROXIMATE SCALE IN FEET

N

Soil Gas Sample Locations

Former Nike Battery W-92
Gaithersburg, MD

October 2007

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Figure 11

Building Locations

Former Nike Battery W-92
Gaithersburg, MD

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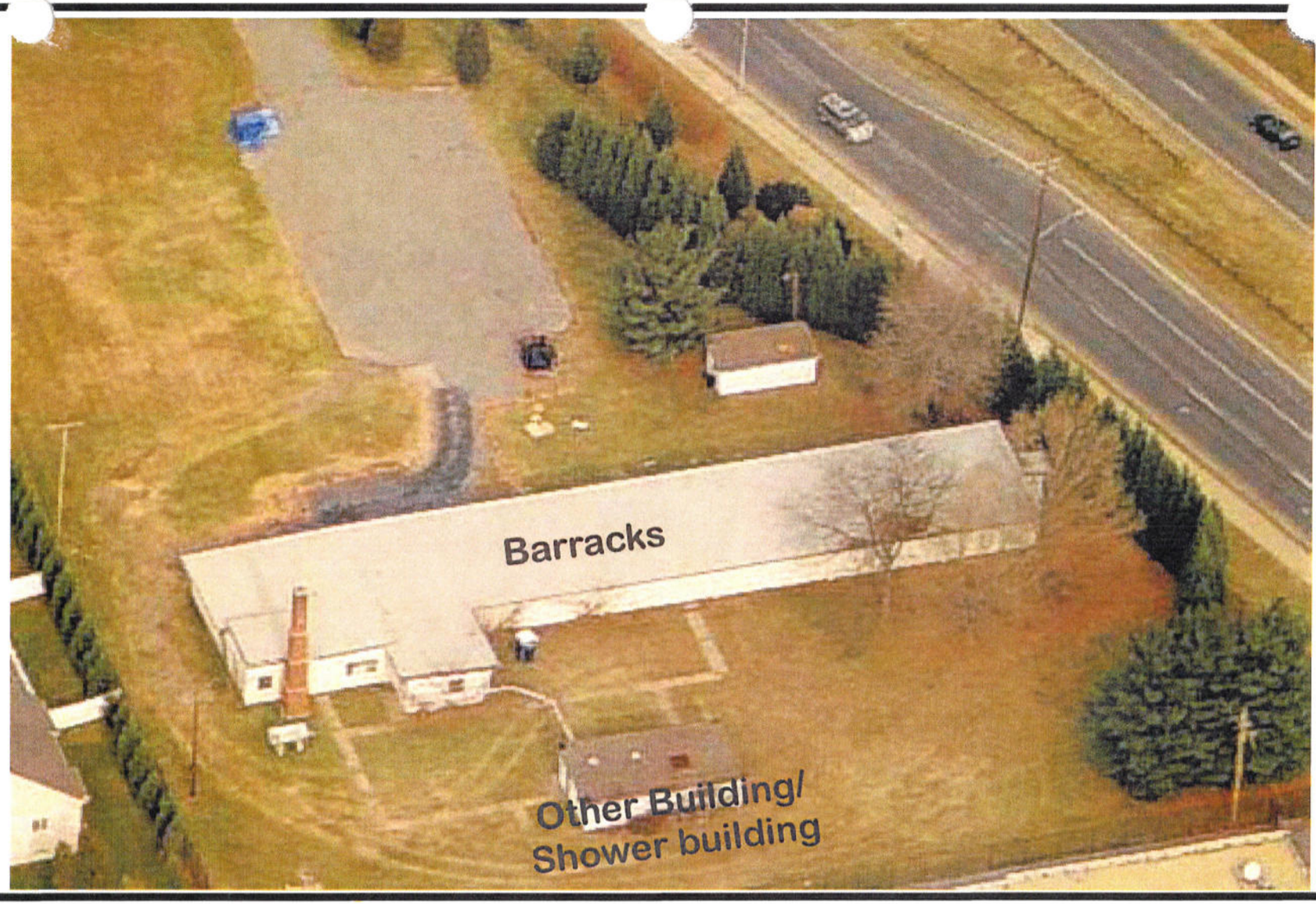

Figure 12

Building Locations

Former Nike Battery W-92
Gaithersburg, MD

N

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TABLES

Table 2
PID Response - Boring SB-2
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Unils Date Sampled	SB-2A ppm 8/22/2007	SB-2B ppm 8/22/2007	SB-2C ppm 8/22/2007	SB-2D ppm 8/22/2007	SB-2E ppm 8/22/2007	SB-2F ppm 8/22/2007	SB-2G ppm 8/22/2007
Total VOCs - 1' bgs	2.6	1.2	1.7	**0.4**	0.5	0.3	0.3
Total VOCs - 2' bgs	2.3	0.0	1.3	0.2	0.4	0.3	0.1
Total VOCs - 3' bgs	**1.3**	0.1	1.0	0.1	0.3	0.1	0.1
Total VOCs - 4' bgs	1.1	0.6	0.6	0.1	0.0	0.1	0.2

Table 3
Summary of VOCs in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Residential Clean-Up Standards µg/kg	Protection of Groundwater µg/kg	SB-1-1 Soil µg/kg 8/21/2007		SB-1-4 Soil µg/kg 8/21/2007		SB-2-1 Soil µg/kg 8/22/2007		SB-2-4 Soil µg/kg 8/22/2007		SB-3-1 Soil µg/kg 8/21/2007		SB-3-9 Soil µg/kg 8/21/2007		SB-4-1 Soil µg/kg 8/21/2007	
Acetone	780,000	2,500	71		19.1	U	**36.3**		21.2	U	**85.9**		19.6	U	**89.7**	
2-Butanone	4,700,000	7,900	**14.5**		7.6	U	8.4	U	8.5	U	7.6	U	7.9	U	8.5	U
Ethylbenzene	780,000	15,000	1.5	U	1.5	U	1.7	U	**3.8**		1.5	U	1.6	U	1.7	U
Methylene Chloride	85,000	19	1.6		**1.5**	U	1.7	U	1.7	U	1.5	U	1.6		1.7	U
Toluene	1,600,000	8,800	1.5	U	1.5	U	1.7	U	**13.2**		1.5	U	1.6	U	1.7	U
Total Xylenes	16,000,000	170,000	4.6	U	4.6	U	5.1	U	**18.6**		4.6	U	4.7	U	5.1	U
o-Xylene			1.5	U	1.5	U	1.7	U	2.5	U	1.5	U	1.6	U	1.7	U
mp-Xylene			3.1	U	3.1	U	3.4	U	**16.1**		3.1	U	3.1	U	3.4	U

Detections in bold
U: not detected at a concentration greater than or equal to the PQL
Dup-2 is a blind field duplicate of SB-4-1

Tabic 3
Summary of VOCs in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Residential Clean-Up Standards Rg/kg	Protection of Groundwater Rg/kg	SB-4-4 Soil Rg/kg 8/21/2007		SB-5-4 Soil Rg/kg 8/21/2007		SB-7-1 Soil Rg/kg 8/22/2007		SB-7-6 Soil Rg/kg 8/22/2007		SB-8-1 Soil Rg/kg 8/21/2007		SB-8-4 Soil Rg/kg 8/21/2007		Dup-2 Soil Rg/kg 8/22/2007	
Acetone	780,000	2,500	**26.5**		**82.0**		**65.1**		**30.2**		15.8	**U**	**38.8**		**105**	
2-Butanone	4,700,000	7,900	8.6	U	7.7	U	7.3	U	6.7	U	6.3	U	**13.1**		**12.5**	
Ethylbenzene	780,000	15,000	1.7	U	1.5	U	1.5	U	1.3	U	1.3	U	1.5	U	1.1	**u**
Methylene Chloride	85,000	19	1.7	U	1.5	**U**	1.5	U	1.3	**U**	1.3	U	1.5	U	**1.7**	
Toluene	1,600,000	8,800	1.7	U	1.5	U	1.5	U	1.3	U	1.3	U	1.5	U	1.1	U
Total Xylenes	16,000,000	170,000	5.2	U	**5.7**		4.4	**U**	4.0	U	3.8	**U**	4.4	**U**	3.3	U
o-Xylene			1.7	U	**2.0**		1.5	U	1.3	U	1.3	U	1.5	U	1.1	U
mp-Xylene			3.5	U	**3.7**		2.9	**U**	2.7	U	2.5	U	3.0	U	2.2	U

Detections in bold
U: not detected at a concentration greater than or equal to the PQL
Dup-2 is a blind field duplicate of SB-4-1

Table 4
Summary of SVOCs in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	Protection of	SB-1-1		SB-1-4		SB-2-1		SB-2-4		SB-3-1		SB-3-9		SB-4-1		SB-4-4	
Medium	Clean-Up Standards	Groundwater	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	gg/kg	Pg/kg	Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg	
Dale Sampled			8/21/2007		8/21/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/21/2007		8/21/2007	
Benzo(a)an(hracene	870	1,500	89	U	83	U	77	U	79	U	82	U	78	U	82	U	86	U
Benzo(a)pyrene	330	370	89	U	83	U	77	U	79	U	82	U	78	U	82	U	86	U
Bcnzo(b)fluoranthcnc	870	4,500	89	U	83	U	77	U	79	U	82	U	78	U	82	U	86	U
Benzo(k)fluorantlienc	8,700	45,000	89	U	83	U	77	U	79	U	82	U	78	U	82	U	86	U
Bis(2-ChloroetIryl)etlier	580	330	127	U	118	U	110	U	113	U	117	U	112	U	117	u	124	U
Chrysene	87,000	150,000	89	U	83	U	77	U	79	u	82	u	78	U	82	U	86	U
Fluoranthene	310,000	6,300,000	89	U	83	U	77	U	79	U	82	U	78	U	**158**		86	U
Indeno(1 2 3-cd)pyrene	870	13,000	89	U	83	U	77	U	79	U	82	U	78	U	82	U	86	U
Phenanthrene	2,300,000	470,000	89	U	83	U	77	U	79	U	82	U	78	U	**93**		86	U
Pyrene	230,000	680,000	89	U	83	U	77	U	79	U	82	u	78	U	**137**		86	U

Detections in Imlil

U: not detected at a concentration greater than or equal to the PQL

Dup-2 is a blind field duplicate of SB-4-1

Tabic 4
Summary of SVOCs in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	Protection of	SB-5-4		SB-6-1		SB-7-1		SB-7-6		SB-8-1		SB-8-4		Dup-2	
Medium	Clean-Up Standards	Groundwater	Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	Pg/kg	Pg/kg	Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg		Pg/kg	
Date Sampled			8/21/2007		8/22/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/22/2007	
Bcnzo(a)anthraccnc	870	1,500	74	U	73	U	**117**		**192**		82	U	86	U	**168**	
Benzo(a)pyrene	330	370	74	U	73	U	**115**		**180**		82	U	86	U	**173**	
Benzo(b)fluoranthene	870	4,500	74	U	73	U	**117**		**167**		82	U	86	U	**149**	
Benzo(k)lluoranlhcne	8,700	45,000	74	U	73	U	**108**		**160**		82	U	86	U	**163**	
Bis(2-Chloroetliyl)ether	580	330	105	U	105	U	112	U	116	U	117	U	123	U	112	U
Chrysene	87,000	150,000	74	U	73	U	**113**		**207**		82	U	86	U	**179**	
fluoranthene	310,000	6,300,000	74	U	73	U	212		**274**		82	U	86	U	**384**	
Indcno(1 2 3-cd)pyrene	870	i3,000	74	U	73	U	78	U	**91**		82	U	86	U	**98**	
Plienanlhrene	2,300,000	470,000	74	U	73	U	**114**		**133**		82	U	86	U	**228**	
Pyrene	230,000	680,000	74	U	73	U	189		**301**		82	U	86	U	**314**	

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Dup-2 is a blind field duplicate of SB-4-1

Tabic 5
Summary of PCBs in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	SB-1-1		SB-5-1		SB-7-1		Dup-2	
Medium	Clean-Up Standards	Soil		Soil		Soil		Soil	
Units	Mg/kg	Mg/kg		Mg/kg		Mg/kg		Mg/kg	
Date Sampled		8/21/2007		8/21/2007		8/22/2007		8/22/2007	
Aroclor-1016	82,000	43	U	39	U	38	U	38	U
Aroclor-1221	2,900	43	U	39	U	38	U	38	U
Aroclor-1232	2,900	43	U	39	U	38	U	38	U
Aroelor-1242	2,900	43	U	39	U	38	U	38	U
Aroclor-1248	2,900	43	U	39	U	38	U	38	U
Aroclor-1254	2,900	43	U	39	U	38	U	38	U
Aroclor-1260	2,900	43	U	39	**u**	38	U	38	U

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Dup-2 is a blind field duplicate of SB-4-1; which was not analyzed for PCBs.

Table 6
Summary of Pesticides and Herbicides in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	SB-1-1		SB-5-1		SB-7-1		Dup-2	
Medium	Clean-Up Standards	Soil		Soil		Soil		Soil	
Units	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg	
Date Sampled		8/21/2007		8/21/2007		8/22/2007		8/22/2007	
Aldrin	38	2.2	U	2.0	U	1.9	U	1.9	U
alpha-BHC	100	2.2	U	2.0	U	1.9	U	1.9	U
beta-BHC	350	2.2	U	2.0	U	1.9	U	1.9	U
delta-BHC	490	2.2	U	2.0	U	1.9	U	1.9	U
gamma-BHC	490	2.2	U	2.0	U	1.9	U	1.9	U
alpha-CMordane	1,800	2.2	U	2.0	U	1.9	U	1.9	U
gamma-Chlordane	1,800	2.2	U	2.0	U	1.9	U	1.9	U
4 4'-DDD	2,700	4.3	U	3.9	U	3.8	U	3.8	U
4 4'-DDE	1,900	4.3	U	3.9	U	3.8	U	3.8	U
4 4'-DDT	1,900	4.3	U	3.9	U	3.8	U	3.8	U
Dieldrin	40	4.3	U	3.9	U	3.8	U	3.8	U
Endosulfan I	47,000	2.2	U	2.0	U	1.9	U	1.9	U
Endosulfan II	47,000	4.3	U	3.9	U	3.8	U	3.8	U
Endosulfan Sulfate	47,000	4.3	U	3.9	U	3.8	U	3.8	U
Endrin	2,300	4.3	U	3.9	U	3.8	U	3.8	U
Endrin Aldehyde	2,300	4.3	U	3.9	U	3.8	U	3.8	U
Endrin Ketone	2,300	4.3	U	3.9	U	3.8	U	3.8	U
Heptachlor	140	2.2	U	2.0	U	1.9	U	1.9	U
Heptachlor Epoxide	70	2.2	U	2.0	U	1.9	U	1.9	U
Methoxychlor	39,000	4.3	U	3.9	U	3.8	U	3.8	U
Mirex		4.3	U	3.9	U	3.8	U	3.8	U
Toxaphene	580	91	U	82	U	80	U	80	U
2 4-D		19	U	18	U	17	U	17	U
2 4-DB		19	U	18	U	17	U	17	U
Dalapon		58	U	53	U	51	U	51	U
Dicamba		19	U	18	U	17	U	17	U
Dichloroprop		19	U	**18**	U	17	U	17	U
Dinoseb		39	U	35	U	34	U	34	U
MCPA		6,500	U	5,900	U	5,700	U	5,600	U
MCPP		6,500	U	5,900	U	5,700	U	5,600	U
4-Nitrophenol		39	U	35	U	34	U	34	U
Pentachlorophenol		19	U	18	U	17	U	17	U
2 4 5-T		19	U	18	U	17	U	17	U
2 4 5-TP		19	U	18	U	17	U	17	U

Detections in bold
U: not detected at a concentration greater than or equal to the PQL
Dup-2 is a blind field duplicate of SB-4-1; which was not analyzed for Pesticides or Herbicides

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Tabic 7
Summary of GRO, DRO and Cyanide in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	SB-1-1		SB-1-4		SB-2-1		SB-2-4		SB-3-1		SB-3-9		SB-4-1		SB-4-4	
Medium	Clean-Up Standards	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	Rg/kg	Rg/kg		Rg/kg		Rg/kg		Rg/kg		Rg/kg		Rg/kg		Rg/kg		Rg/kg	
Date Sampled		8/21/2007		8/21/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/21/2007		8/21/2007	
TP11-DRO	230,000	NA	U	NA	U	6,000	U	6,100	u	6,300	U	NA	U	6,400	U	NA	U
TPH-GRO	230,000	NA	U	NA	U	NA	U	NA	U	NA	U	NA	U	7,870	U	NA	U
Cyanide		320	U	300	U	280	U	290	U	300	U	290	U	310	U	320	U

Detections in bold
U: not detected at a concentration greater than or equal to the PQL
Dup-2 is a blind field duplicate of SB-4-1
NA: Sample not analyzed for this compound

Tabic 7
Summary of GRO, DRO and Cyanide in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	SB-5-4		SB-6-1		SB-7-1		SB-7-6		SB-8-1		SB-8-4		Dup-2	
Medium	Clean-Up Standards	Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	ug/kg	Bg/kg		Bg/kg		Bg/kg		Bg/kg		Bg/kg		Bg/kg		Bg/kg	
Date Sampled		8/21/2007		8/22/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/22/2007	
TPH-DRO	230,000	**6,700**		5,700	U	NA	U	**6,600**		NA	U	NA	U	**6,500**	
TPH-GRO	230,000	10,300	U	NA	U	NA	U	7,250	U	NA	U	NA	U	1,200	U
jCyanide		NA	U	NA	U	280	U	300	U	290	U	310	U	280	U

Detections in bold

U: not detected at a concentration greater than or equal to the PQ

Dup-2 is a blind field duplicate of SB-4-1

NA: Sample not analyzed for this compound

Table 8
Tentatively Identified Compounds in Soil
VOCs and SVOCs
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	SB-1-1		SB-14		SB-2-1		SB-2-4		SB-3-1		SB-3-9		SB-4-1	
Medium	Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	gg/kg		gg/kg		gg/g		gg/kg		gg/kg		gg/kg		gg/kg	
Date Sampled	8/21/2007		8/21/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/21/2007	
1-Heptene	ND		ND		ND		1.9	NJ	ND		ND		ND	
1-Octadecene	ND		ND		191	NJ	ND		ND		ND		ND	
1-Tetradecanol	ND		ND		ND		140	NJ	ND		ND		ND	
2-Butanone, 3-methyl-	ND		ND		ND		ND		ND		ND		ND	
3-Keto-URS-12-ENE	ND		ND		ND		ND		ND		ND		ND	
3-Penten-2-one, 4-methyl-	ND		138	NJ	ND		ND		ND		ND		ND	
4,5,7,8-Tetramethyl (2.2] (3'	ND		ND		ND		ND		ND		ND		ND	
4-Hydroxy-4-methylpentan-2-one	ND		ND		ND		ND		ND		ND		ND	
Acetealdehyde	ND		ND		ND		ND		ND		ND		2.3	NJ
Aldol Condensate	29,838	J	27,186	J	31,325	J	30,423	J	28,500	J	26,395	J	23,580	J
Benzene, 1,2,4-trimethyl-	ND		ND		ND		3.0	NJ	ND		ND		ND	
Benzoic Acid, 2-[(trimethyl	ND		ND		ND		1.9	NJ	ND		ND		ND	
Benzoic acid, 2-hydroxy, TMS	ND		ND		ND		ND		ND		ND		ND	
Butane, 2-methyl-	ND		ND		ND		ND		ND		ND		ND	
Butyl hexadecanoate	ND		ND		ND		ND		ND		ND		ND	
Cyclopentane	ND		ND		38.8	NJ	ND		5.0	NJ	ND		8.8	NJ
Cyclobutanol	ND		ND		38.8	NJ	ND		5.0	NJ	ND		**8.8**	NJ
Cyclopentane, methyl-	ND		ND		ND		ND		ND		ND		ND	
Decane, 2,2, 5-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Decane, 2,2,9-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Decane, 3, 3, 6-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Decane, 3-methyl-	ND		ND		ND		ND		ND		ND		ND	
D-Limonene	ND		ND		ND		ND		ND		ND		ND	
Docosanic acid	ND		ND		ND		ND		ND		ND		ND	
Dodecane, 2,6,10-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Dodecane, 2,6,11-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Dotriacontane	ND		ND		ND		ND		ND		ND		ND	
Eicosane	ND		ND		ND		ND		ND		ND		ND	
Heptanal	ND		ND		ND		ND		ND		25.4	NJ	ND	
Heptane, 2,5-dimethyl-	ND		ND		ND		ND		152	NJ	ND		ND	
Heptane, 2,6-dimethyl-	ND		ND		ND		ND		ND		ND		ND	
Hexadecanoic Acid	ND		ND		282	NJ	ND		ND		ND		ND	
Hexadecanoic Acid, butyl ester	ND		ND		ND		ND		ND		ND		ND	
Hexanal	1.5	NJ	ND		3.5	NJ	ND		8.5	NJ	ND		**6.0**	NJ
Hexane, 2, 2, 4-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Nonanal	2.6	NJ	ND		ND		ND		ND		13.1	NJ	ND	
Nonane, 5-butyl-	ND		ND		ND		ND		ND		ND		ND	
Octadecane, 1-chloro-	ND		ND		ND		ND		ND		ND		ND	
Octadecanoic acid, butylester	ND		ND		ND		ND		ND		ND		ND	
Octanal	3.4	NJ	ND		ND		ND		ND		52	NJ	ND	
Octane	ND		ND		ND		ND		ND		**10.6**	NJ	ND	
Octane, 2, 3, 6, 7-tetramethyl	ND		ND		ND		ND		ND		ND		ND	
Octane, 3-methyl-	ND		ND		ND		159	NJ	ND		ND		ND	
Oxirane, [(dodecyloxy) methyl]-	ND		ND		ND		ND		ND		**J®**		ND	
Pentadecane	ND		ND		ND		ND		ND		ND		ND	
Tetradecanoic Acid	ND		ND		ND		ND		ND		ND		ND	

Tentatively Identified Compounds (Tics)

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

J: indicates an estimated value

N: The identification of the compound is based on a mass spectral library search

Dup-2 is a blind field duplicate of SB-4-1

Table 8
Tentatively Identified Compounds in Soil
VOCs and SVOCs
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	SB-4-4		SB-5-4		SB-7-1		SB-7-6		SB-8-1		SB-8-4		Dup-2	
Medium	Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	gg/kg		gg/kg		gg/kg		gg/kg		gg/kg		gg/kg		gg/kg	
Date Sampled	8/21/2007		8/21/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/22/2007	
1-Heptene	ND		ND		ND		ND		ND		ND		ND	
1-Octadecene	ND		ND		ND		ND		ND		ND		ND	
1-Tetradecanol	ND		ND		ND		ND		ND		ND		ND	
2-Butanone, 3-methyl-	ND		ND		ND		ND		ND		ND		2.6	NJ
3-Keto-URS-12-ENE	ND		ND		ND		ND		ND		ND		160	
3-Penten-2-one, 4-methyl-	ND		ND		150	NJ	153	NJ	163	NJ	152	NJ	168	
4,S,7,8-Tetramethyl (2.2) (3'	191	NJ	ND		ND		ND		ND		ND		ND	
4-Hydroxy-4-methylpentan-2-one	23,779	NJ	ND		20,544	NJ	19,674	NJ	23,223		23,932	NJ	26,030	NJ
Acetealdehyde	ND		ND		*2.1*	NJ	ND		ND		ND		**2.8**	NJ
Aldol Condensate	ND		25,109	J	ND		ND		ND		ND		ND	
Benzene, 1,2,4-trimethyl-	ND		ND		ND		ND		ND		ND		ND	
Benzoic Acid, 2-[(trimethyl	ND		ND		ND		ND		ND		ND		ND	
Benzoic acid, 2-hydroxy, TMS	ND		ND		ND		ND		ND		ND		ND	
Butane, 2-methyl-	ND		3.64	NJ	ND		ND		ND		ND		ND	
Butyl hexadecanoate	ND		ND		ND		ND		ND		ND		ND	
Cyclopentane	ND		12.7	NJ	ND		ND		ND		ND		ND	
Cyclobutanol	ND		1.78	NJ	ND		ND		ND		ND		ND	
Cyclopentane, methyl-	ND		1.38	NJ	ND		ND		ND		ND		ND	
Decane, 2,2, 5-trimethyl-	ND		ND		ND		ND		ND		ND		3.3	NJ
Decane, 2,2,9-trimethyl-	ND		ND		ND		ND		ND		ND		7.2	NJ
Decane, 3, 3, 6-trimethyl-	ND		ND		ND		ND		ND		ND		4.6	NJ
Decane, 3-methyl-	ND		ND		ND		ND		ND		ND		3.9	NJ
D-Limonene	ND		ND		ND		ND		ND		ND		36.8	NJ
Docosanic acid	ND		ND		ND		187	NJ	ND		ND		ND	
Dodecane, 2,6,10-trimethyl-	ND		ND		ND		ND		ND		ND		17.4	NJ
Dodecane, 2,6,11-trimethyl-	ND		149	NJ	ND		ND		ND		ND		ND	
Dotriacontane	ND		ND		ND		ND		ND		ND		ND	
Eicosane	ND		202	NJ	ND		ND		ND		ND		ND	
Heptanal	ND		ND		ND		ND		ND		ND		ND	
Heptane, 2,5-dimethyl-	133	NJ	ND		ND		150	NJ	152	NJ	166	NJ	178	NJ
Heptane, 2,6-dimethyl-	ND		ND		133	NJ	131	NJ	135	NJ	146	NJ	155	NJ
Hexadecanoic Acid	ND		ND		142	NJ	ND		ND		ND		180	NJ
Hexadecanoic Acid, butyl ester	ND		ND		ND		ND		265	NJ	ND		ND	
Hexanal	ND		**10**	NJ	**2.8**	NJ	ND		ND		ND		**22.8**	NJ
Hexane, 2, 2, 4-trimethyl-	ND		ND		ND		ND		ND		ND		39.4	NJ
Nonanal	ND		ND		ND		ND		ND		ND		ND	
Nonane, 5-butyl-	ND		ND		ND		ND		ND		ND		4.0	NJ
Octadecane, 1-chloro-	ND		ND		ND		ND		ND		ND		ND	
Octadecanoic acid, butyl ester	ND		ND		ND		ND		ND		ND		ND	
Octanal	ND		2.7	NJ	ND		ND		ND		ND		ND	
Octane	ND		ND		ND		ND		ND		ND		ND	
Octane, 2, 3, 6, 7-tetramethyl	ND		ND		ND		ND		ND		ND		9.8	NJ
Octane, 3-methyl-	ND		ND		143	NJ	ND		ND		ND		ND	
Oxirane, [(dodecyloxy) methyl]-_	ND		ND		ND		ND		ND		ND		151	NJ
Pentadecane	ND		ND		ND		ND		203	NJ	ND		ND	
Tetradecanoic Acid	ND		ND		ND		ND		ND		ND		ND	

Tentatively Identified Compounds (Tics)
Detections in bold
U: not detected at a concentration greater than or equal t
J: indicates an estimated value
N: The identification of the compound is based on a mas
Dup-2 is a blind field duplicate of SB-4-1

Tabic 9
Summary of PPL Metals in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Residential Clean-Up Standards gg/kg	SB-1-1 Soil gg/kg 8/21/2007		SB-1-4 Soil gg/kg 8/21/2007		SB-2-1 Soil gg/kg 8/22/2007		SB-2-4 Soil gg/kg 8/22/2007		SB-3-1 Soil gg/kg 8/21/2007		SB-3-9 Soil gg/kg 8/21/2007		SB-4-1 Soil gg/kg 8/21/2007	
Antimony	12,000	**4,000**	J	500	U	**600**	J	500	U	300	U	400	U	400	U
Arsenic	2,000	**3,000**		**4,000**		**5,000**		**6,000**		**5,000**		**5,000**		**4,000**	
Beryllium	16,000	**700**	J	**700**	J	**900**	J	1,000		**800**		**700**	J	**800**	
Chromium	23,000	**20,600**		**24,200**		**26,400**		**23,100**		**25,200**		**10,300**		**26,600**	
Copper	310,000	**26,000**		**34,000**		**27,000**		**30,000**		**28,000**		**94,000**		**43,000**	
Lead	400,000	**17,000**		**13,000**		**17,000**		**14,000**		**14,000**		**18,000**		**18,000**	
Nickel	160,000	**14,000**		**13,000**		**21,000**		**14,000**		**15,000**		**28,0011**		**15,000**	
Selenium	39,000	**500**	J	500	U	500	U	**800**	J	**500**	J	400	U	400	U
Thallium	2,000	**3,000**		2,000	J	**3,000**		**3,000**	J	**3,000**		**4,000**		700	U
Zinc	2,300,000	**33,000**		21,000		**43,000**		**30,000**		**31,000**		**82,000**		**27,000**	

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

DUP-2 is a blind field duplicate of SB-14-1

Values in Red indicate exceedance of the MDE Residential Clean-up Standards for Soil

Tabic 9
Summary of PPL Metals in Soil
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	SB-4-4		SB-7-1		SB-7-6		SB-8-1		SB-8-4		Dup-2	
Medium	Clean-Up Standards	Soil		Soil		Soil		Soil		Soil		Soil	
Units	gg/kg	gg/kg		gg/kg		gg/kg		gg/kg		gg/kg		gg/kg	
Date Sampled		8/21/2007		8/22/2007		8/22/2007		8/21/2007		8/21/2007		8/22/2007	
Antimony	12,000	500	U	300	U	**600**	J	400	**u**	300	**u**	500	**u**
Arsenic	2,000	**6,000**		**4,000**		**5,000**		**3,000**		6,000		**5,000**	
Beryllium	16,000	**800**	J	**800**		**800**		**700**	J	**800**		**800**	J
Chromium	23,000	**25,900**		**28,300**		**29,100**		**27,200**		**27,900**		**29,600**	
Copper	310,000	**34,000**		**35,000**		**29,000**		**27,000**		**31,000**		**35,000**	
Lead	400,000	**17,000**		**16,000**		**16,000**		**15,000**		**16,000**		**28,000**	
Nickel	160,000	**17,000**		**23,000**		**17,000**		**18,000**		**15,000**		**17,000**	
Selenium	39,000	700	J	300	U	400	U	400	U	300	U	500	U
Thallium	2,000	**3,000**		600	U	1,000	J	**2,000**	J	600	**u**	**3,000**	
Zinc	2,300,000	**34,000**		**34,000**		**38,000**		**24,000**		**29,000**		**42,000**	

Detections in bold

U: not delected at a concentration greater than or equal to the PQL

DUP-2 is a blind field duplicate of SB-14-1

Values in Red indicate exceedance of the MDE Residential Clean-up Standards for Soil

Table 10
Summary of VOCs in Groundwater
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Type I and II Aquifers Clean-Up Standards pg/L	MW-2 Water pg/L 7/12/2007		MW-3 Water pg/L 7/12/2007		MW-4 Water Rg/L 7/12/2007		Dup-1 Water pg/L 7/12/2007	
Acetone	61	10	U	10	U	10	U	10	U
Benzene	5.0	1	U	1	U	1	U	1	U
Bromochloromethane		1	U	1	U	1	U	1	U
Bromodichloromethane	80	1	U	1	U	1	u	1	u
Bromoform	80	1	U	1	U	1	U	1	U
Bromomethane	1.0	1	U	1	u	1	u	1	u
2-Butanone	190	10	U	10	U	10	U	10	U
Carbon Disulfide	100	1	U	1	U	1	U	1	U
Carbon Tetrachloride	5.0	1	U	1	u	1	u	1	u
Chlorobenzene	11	1	U	1	U	1	u	1	u
Chlorodibromomethane		1	U	1	U	1	u	1	u
Chloroethane	3.6	1	U	1	U	1	u	1	u
Chloroform	80	1	U	1	U	1	U	1	U
Chloromethane	2.1	1	U	1	U	1	U	1	U
1 2-Dibromo-3-chloropropane		7	U	7	U	7	U	7	U
1 2-Dibromoethane	1.0	1	U	1	U	1	u	1	u
1 1-Dichloroethane	80	1	u	1	u	1	u	1	u
1 2-Dichloroethane	5	1	U	1	U	1	u	1	u
1 1-Dichloroethene	7.0	1	U	1	U	1	U	1	U
cis-1 2-Dichloroethene	70	1	u	1	U	1	u	1	u
trans-1 2-Dichloroethene	100	1	U	1	U	1	u	1	u
1 2-Dichloropropane	5.0	1	U	1	U	1	u	1	u
cis-1 3-Dichloropropene	1.0	1	U	1	U	1	U	1	U
trans-1 3-Dichloropropene	1.0	1	U	1	U	1	U	1	U
Ethylbenzene	700	1	U	1	U	1	U	1	U
2-Hexanone	150	5	U	5	U	5	U	5	U
4-Methyl-2-Pentanone(MIBK)	50	5	U	5	U	5	U	5	U
Methylene Chloride	5.0	1	U	1	U	1	U	1	U
Styrene	100	1	U	1	U	1	U	1	U
112 2-Tetrachloroethane	1.0	1	U	1	u	1	u	1	u
Tetrachloroethene	5.0	1	U	1	U	1	U	1	U
Toluene	1,000	1	U	1	u	1	u	1	u
Total Xylenes	10,000	3	U	3	U	3	U	3	U
1 1 1-Trichloroethane	200	1	U	1	U	1	U	1	U
1 1 2-Trichloroethane	5.0	1	U	1	U	1	U	1	U
Trichloroethene	5.0	1	U	1	U	1	U	1	U
Vinyl Chloride	2.0	1	U	1	U	1	u	1	u
o-Xylene		1	U	1	u	1	u	1	u
mp-Xylene		2	U	2	U	2	U	2	U

There were no Tentatively Identified Compounds (Tics) reported for any of the samples

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Dup-1 is a blind field duplicate of MW-4

Tabic 11
Summary ol' SVOCs in Groundwater
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Type 1 and II Aquifers Clean-Up Standards bg/L	MW-2 Water bg/L 7/12/2007		MW-3 Water bg/L 7/12/2007		MW-4 Water bg/L 7/12/2007		Dup-1 Water bg/L 7/12/2007	
Acenaphthene	37	1.4	U	1.4	U	1.4	U	1.4	U
Acenaphthylene	37	1.4	U	1.4	U	1.4	U	1.4	U
Anthracene	180	1.4	U	1.4	U	1.4	U	1.4	U
Benzo(a)anthracene	10	1.4	U	1.4	U	1.4	U	1.4	U
Benzo(a)pyrene	10	1.4	U	1.4	U	1.4	U	1.4	U
Benzo(b)fluoranthene	10	1.4	U	1.4	U	1.4	U	1.4	U
Benzo(g h i)pciylene	18	1.4	U	1.4	U	1.4	U	1.4	U
Bcnzo(k)lluoranlhenc	10	1.4	U	1.4	U	1.4	U	1.4	U
4-Bromopbenyl-phcnylether		2.8	U	2.8	U	2.8	U	2.8	U
Butylbenzylphthalate		2.8	U	2.8	U	2.8	U	2.8	U
Carbazole	10	2.8	U	2.8	U	2.8	U	2.8	U
4-Chloro-3-mcthylphenol		7.5	U	7.5	U	7.5	U	7.5	U
4-Chloroaniline	20	2.8	U	2.8	U	2.8	U	2.8	U
Bis(2-Chloroethoxy)melhane		2.8	U	2.8	U	2.8	U	2.8	U
Bis(2-Chlorocthyl)cther	10	2.8	U	2.8	U	2.8	U	2.8	U
bis(2-ChIoroisopropyl)ether		2.8	U	2.8	U	2.8	U	2.8	U
2-Chloronaphthalene	49	2.8	U	2.8	U	2.8	U	2.8	U
2-Chlorophenol	20	7.5	U	7.5	U	7.5	U	7.5	U
4-Chlorophenyl-phcnylether		2.8	U	2.8	U	2.8	U	2.8	U
Chrysene	10	1.4	U	1.4	U	1.4	U	1.4	U
mp-Cresol		7.5	U	7.5	U	7.5	U	7.5	U
o-Cresol		7.5	U	7.5	U	7.5	U	7.5	U
Di-n-Butylphthalate	37	2.8	U	2.8	U	2.8	U	2.8	U
Di-n-Octylphthalate	73	7.5	U	7.5	U	7.5	U	7.5	U
Dibenzo(a h)anlhracene	10	1.4	U	1.4	U	1.4	U	1.4	U
Dibenzofuran	10	2.8	U	2.8	U	2.8	U	2.8	U
1 2-Dichlorobenzene	600	2.8	U	2.8	U	2.8	U	2.8	U
1 3-Dichlorobenzene	18	2.8	U	2.8	U	2.8	U	2.8	U
1 4-Dichlorobenzene	75	2.8	U	2.8	U	2.8	U	2.8	U
3 3-Dichlorobenzidine	100	7.5	U	7.5	U	7.5	U	7.5	U
2 4-Dichlorophenol	11	7.5	U	7.5	U	7.5	U	7.5	U
Diethylphlhalate _	2,900	7.5	U	7.5	U	7.5	U	7.5	U
2 4-Dimethylphenol	11	7.5	U	7.5	U	7.5	U	7.5	U

Tabic 11
Summary of SVOCs in Groundwater
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Type I and II Aquifers Clean-Up Standards gg/L	MW-2 Water gg/L 7/12/2007		MW-3 Water gg/L 7/12/2007		MW-4 Water gg/L 7/12/2007		Dup-1 Water gg/L 7/12/2007	
Dimethyl-phthalate	37	7.5	U	7.5	U	7.5	U	7.5	U
2 4-Dinitrophenol	10	15	U	15	U	15	U	15	U
2 4-Dinitrotoluenc	50	2.8	U	2.8	U	2.8	U	2.8	U
2 6-Dinitrotoluene	50	7.5	U	7.5	U	7.5	U	7.5	U
bis(2-Ethy)hexyl)phthalate	20	2.8	U	2.8	U	2.8	U	2.8	U
Fluoranthene	150	1.4	U	1.4	U	1.4	U	1.4	U
Fluorene	24	1.4	U	1.4	U	1.4	U	1.4	U
Hexachlorobenzene		2.8	U	2.8	U	2.8	U	2.8	U
Hexachlorobuladicne	10	2.8	U	2.8	U	2.8	U	2.8	U
Hexachlorocyclopentadiene	50	7.5	U	7.5	U	7.5	U	7.5	U
Flexachloroethane	10	2.8	U	2.8	U	2.8	U	2.8	U
lndcno(1 2 3-cd)pyrene	10	1.9	U	1.9	U	1.9	U	1.9	U
Isophoronc	70	2.8	U	2.8	U	2.8	U	2.8	U
2-Methyl-4 6-dinitrophenol		15	U	15	U	15	U	15	U
2-Methylnaphthalene	20	1.4	U	1.4	U	**1.4**	U	1.4	U
Naphthalene	10	1.4	U	**1.4**	U	1.4	U	1.4	U
2-Nilroaniline	10	7.5	U	7.5	U	7.5	U	7.5	U
3-Nitroaniline		7.5	U	7.5	U	7.5	U	7.5	U
4-Nitroanilinc	10	7.5	U	7.5	U	7.5	U	7.5	U
Nitrobenzene	20	2.8	U	2.8	U	2.8	U	2.8	U
2-Nitrophenol	29	7.5	U	7.5	U	7.5	U	7.5	U
4-Nitroghenol	50	7.5	U	7.5	U	7.5	U	7.5	U
N-Nitroso-di-n-propylamine	10	2.8	U	2.8	U	2.8	U	2.8	U
N-Nitrosodiphenylamine	50	2.8	U	2.8	U	2.8	U	2.8	U
Pcntachlorophcnol	50	15	U	15	U	15	U	15	U
ghenanthrene	180	1.4	U	1.4	U	1.4	U	1.4	U
Phenol	2,200	7.5	U	7.5	U	7.5	U	7.5	U
Pyrene	18	1.4	U	1.4	U	1.4	U	1.4	U
1 2 4-Trichlorobenzene	70	2.8	U	2.8	U	2.8	U	2.8	U
2 4 5-Trichlorophenol	370	7.5	U	7.5	U	7.5	U	7.5	U
2 4 6-Trichlorophenol	10	7.5	U	7.5	U	7.5	U	7.5	U

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Values in Red indicate exceedance of the MDE Groundwater Clean-Up Standard

Dup-1 is a blind field duplicate of MW-4

Tabic 12
Summary of Dissolved Metals in Groundwater
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Type I and II Aquifers Clean-Up Standards ng/L	MW-2 Water pg/L 7/12/2007		MW-3 Water [xg/L 7/12/2007		MW-4 Water gg/L 7/12/2007		Dup-I Water gg/L 7/12/2007	
Antimony	6.0	20	U	20	**u**	20	U	20	U
Arsenic	50	10	U	10	**u**	10	**u**	10	**u**
Beryllium	4.0	4.0	U	4.0	U	4.0	U	4.0	U
Cadmium	5.0	2.0	U	2.0	U	2.0	U	2.0	U
Chromium	100	5.0	**u**	5.0	**u**	5.0	U	5.0	U
Copper	1,300	10	U	10	**u**	10	**u**	10	**u**
Lead	15	6.0	U	6.0	U	6.0	U	6.0	U
Mercury	2.0	0.5	U	0.5	U	0.5	U	0.5	U
Nickel	73	20	U	20	U	20	U	20	U
Selenium	50	20	U	20	U	20	U	20	U
Silver	18	4.0	U	4.0	U	4.0	U	4.0	U
Thallium	2.0	20	U	20	U	20	U	20	U
Zinc	1,100	20	U	20	U	**40**		**40**	

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Dup-1 is a blind field duplicate of MW-4

Samples were field filtered

Table 13
Summary ofGRO, DRO and Perchlorate in Groundwater
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Date Sampled	Type 1 and II Aquifers Clean-Up Standards pg/L	MW-2 Water pg/L 7/12/2007		MW-3 Water pg/L 7/12/2007		MW-4 Water pg/L 7/12/2007		Dup-1 Water pg/L 7/12/2007	
TPH-DRO	47	NA	U	NA	U	38	U	NA	U
TPH-GRO	47	NA	U	NA	U	40	U	NA	U
Perchlorate		4.0	U	4.0	U	4.0	U	4.0	U

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Dup-1 is a blind field duplicate of MW-4

Table 14
Summary of VOCs in Soil Gas
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID Medium Units Dale Sampled	EPA Generic Screening Levels Shallow Soil Gas pg/m^3 Risk 1x10^5	SG-1 Vapor gg/m^3 8/21/2007		SG-2 Vapor pg/m^3 8/21/2007		SG-3 Vapor pg/m^3 8/21/2007		SG-5 Vapor pg/m^3 8/21/2007		SG-6 Vapor pg/m^3 8/21/2007		SG-7 Vapor pg/m^3 8/21/2007		SG-8 Vapor pg/m^3 8/21/2007		SG-9 Vapor pg/m^3 8/21/2007		SG-10 Vapor pg/m^3 8/21/2007		SG-11 Vapor pg/m^3 8/21/2007	
Acetone	3,500	402	B	696	B	617	B	309	B	318	B	446	B	301	B	395	B	463	B	395	B
Benzene	31	**8.2**		15.8		3.2		3.4		5.2		1.6	U	5.0		5.2		1.6	U	2.4	
2-Butanone	10,000	124	B	159	B	191	B	165	B	79	B	145	B	139	B	147	B	142	B	232	B
tert.- Butyl Alcohol		4.0		4.4		6.3		1.7		**2.8**		4.1		1.5	U	3.2		3.3		1.8	
Carbon Disulfide	7000	1.6	U	14.3		1.9	U	4.1		1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Chloroform	11	2.4	U	2.4	U	3.0	U	3.7		2.4	U	3.9		14.5		2.4	U	2.4	JJ	2.4	U
Cyclohexane		11.1		18.6		11.1		1.7	U	14		1.7	U	3.9		10.6		2.1		1.7	U
cis-1 2-Dichloroethene	350	2.0	U	2.0	U	2.5	U	2.0	U	2.0	U	2.0	U	3.5		2.0	U	2.0	U	2.0	U
Ethylbenzene	220	5.2		4.5		4.8		3.7		2.2	U	3.9		4.5		2.6		2.6		4.4	
Freon 113	300,000	3.8	U	88.1		8.6		3.8	U	3.8	U	3.8	U	4.3		3.8	U	3.8	U	3.8	U
Heptane		13.4		16.9		6.2		2.0	U	11.4		3.9		11.5		7.3		4.5		3.6	
Hexane	2,000	55.8	II	73.1	B	64.5	B	4.1	B	**68.6**	B	7.2	B	12.4	B	53.7	B	16	B	6.7	B
Isopropyl Alcohol		5.7		5.6		8.9		**8.0**		1.2	U	**6.8**		2.7		5.9		4.3		14.3	
Methyl t-Butyl Ether	30,000	1.8	U	1.8	U	2.2	U	1.8	U	1.8	If	1.8	U	35.2		1.8	U	1.8	U	1.8	JJ
Methylene Chloridc	520	1.7	U	2.0		2.2	U	1.9		1.7	U	1.9		1.7	U	1.8		1.7	U	2.5	
iso-Octane		3.0		4.1		2.9	U	2.3	U	4.1		23	U	2.3	U	2.7		2.3	U	2.3	U
Propylene		26.4		25.3		44.2		25.4		0.9	U	7.0		0.9	U	19.5		8.9		9.9	
Styrene	10,000	2.1	U	2.1	U	2.6	U	2.1	U	2.1	U	2.1	II	2.1	U	2.1	U	2.1	U	2.7	
Tetrahydrofuran		335	B	452	B	467	B	401	B	173	B	339	B	350	B	367	B	374	B	567	B
Toluene	4,000	49.5	B	63.4	B	35.1	B	30.3	B	16.0	B	28.8	B	41.1	B	15.2	B	17.2	B	29.9	B
Total Xylenes		21.4		18.0		21.4		16.0		8.3		17.6		19.1		11.8		12.1		19.3	
Trichloroethene	2.2	2.7	U	2.7	U	3.3	U	4.9		2.7	U	2.7	U	115		2.7	U	2.7	U	8.9	
Trichlorofluoromethane	7,000	2.8	U	2.8	JL	3.5	U	2.8	U	2.8	II	2.8	**U**	**2.8**	U	2.8	U	2.8	U	2.8	U
1 2 4-Trimethylbenzene	60	2.5	U	2.5	**u**	3.0	U	2.5	U	2.5	**u**	2.5	**u**	2.5	U	2.5	**u**	2.5	U	3.7	
Vinyl Acetate	2,000	16.6		20.0		31.0		1.8	U	20.9		1.8	U	1.8	U	18.9		4.6		1.8	U
o-Xylenc	70,000	5.2		4.5		5.5		4.2		2.4		4.5		4.8		3.5		3.5		5.6	
mp-Xylene	140,000	16.2		13.5		15.9		11.8		**6.0**		13.1		14.3		8.3		8.7		13.8	

U: not detected at a concentration greater than or equal to the PQL

B: compound suspected to be biased high

Detections in hold

Values in Red indicate exceedance of the EPA Vapor Intrusion Guidance Criteria for shallow soil gas

Table 15
Asbestos Bulk Sample Results
Former Nike Missile Site W-92
Gaithersburg, Maryland

Homogenous Material Description	Location(s)	Quantity (Square feet)	Sample ID	Result	Type / Category / Condition
Joint Compound	Bungalow # 2	Unknown	B2-1	ND	----
Asphalt Shingles	Bungalow # 2	750	B2-2	ND	----
Joint Compound	Bungalow # 3	Unknown	B3-1	ND	----
Asphalt Shingles	Bungalow # 3	750	B3-2	ND	----
Joint Compound	Bungalow # 4	Unknown	B4-1	ND	----
Asphalt Shingles	Bungalow # 4	750	B4-2	ND	----
Joint Compound	Bungalow # 5	Unknown	B5-1	ND	----
Asphalt Shingles	Bungalow # 5	750	B5-2	ND	----
Joint Compound	Bungalow # 6	Unknown	B6-1	ND	----
Asphalt Shingles	Bungalow # 6	750	B6-2	ND	----
Joint Compound	Bungalow # 7	Unknown	B7-1	ND	----
Asphalt Shingles	Bungalow # 7	750	B7-2	ND	----
Joint Compound	Solar Research Building	Unknown	SRB-1	ND	----
White 9x9 Floor Tile	Missile Assembly Building / Machine Shop	250	MAB-1	7% **Chrysotile**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
Mastic From Above	Missile Assembly Building / Machine Shop	250	MAB-1a	**2% Chrysotile**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
Green 9x9 Floor Tile	Missile Assembly Building / Machine Shop	250	MAB-2	7% **Chrysotile**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
Mastic From Above	Missile Assembly Building / Machine Shop	250	MAB-2a	2% **Chrysotile**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
Debris on Floor (Wallboard)	Missile Assembly/Machine Shop	750	MAB-3	ND	----
Joint Compound	Missile Assembly/Machine Shop	Unknown	MAB-4	ND	----
Black 9x9 Floor Tile	Generator Building	500	GB-1	**8% Chrysotile**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
Mastic From Above	Generator Building	500	GB-1a	**2% Chrysotile**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
9x9 Ceiling Tile	Generator Building	500	GB-2	ND	----
Joint Compound	Research Building / Propellant Handling Building	Unknown	RB-1	ND	----
Black 9x9 Floor Tile	Other Building (Shower Building)	1,000	OB-1	**PACM**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
Mastic From Above	Other Building (Shower Building)	1,000	OB-1a	**PACM**	NESHAP: Cat I –II/NF AHERA: Misc / Damaged
White 9x9 Ceiling Tile	Other Building (Shower Building)	1,000	OB-2	ND	----
Mastic From Above	Other Building (Shower Building)	1,000	OB-2a	ND	----
Black 9x9 Wall Tile	Other Building (Shower Building)	500	OB-3	ND	----
White 12x12 Floor Tile	Silo 2	500	S2-1	ND	----
Mastic From Above	Silo 2	500	S2-1a	ND	----
Sprayed On Fireproofing	Silo 3	10,000	S3-1a	ND	----
			S3-1b	ND	
			S3-1c	ND	
			S3-1d	ND	
			S3-1e	ND	
			S3-1f	ND	
			S3-1g	ND	

Bold text indicates positive asbestos result
ND: Non-Detect
PACM: Presummed Asbestos Containing Material

Tabic 16
Missile Silo Hydraulic System's PCBs
Former Nike Missile Site W-92
Gaithersburg, Maryland

Sample ID	Residential	Silo-1		Silo-2		Silo-2		Silo-3		Silo-1		Silo-3	
Medium	Clean-Up Standards	Oil		Wipe		Oil		Wipe		Oil		Wipe	
Units	gg/kg	gg/kg		pg/wipe		gg/kg		pg/wipe		Og/kg		pg/wipe	
Dale Sampled		8/8/2007		8/8/2007		8/8/2007		8/8/2007		8/8/2007		8/8/2007	
Aroelor-1016	82,000	1,000	U	1.0	U	1,000	**u**	1.0	**u**	1,000	**u**	1.0	**u**
Aroclor-1221	2,900	1,900	U	1.0	U	1,900	**u**	1.0	**u**	1,900	**u**	1.0	**u**
Aroclor-1232	2,900	1,000	U	1.0	U	1,000	IJ	1.0	**u**	1,000	**u**	1.0	**u**
Aroclor-1242	2,900	1,000	**u**	**7.2**		1,000	U	1.0	U	1,000	U	1.0	U
Aroclor-1248	2,900	1,000	U	1.0	IJ	1,000	**u**	1.0	**u**	1,000	**u**	1.0	**u**
Aroclor-1254	2,900	1,000	**u**	1.0	**u**	1,000	**u**	1.0	**u**	1,000	**u**	1.0	**u**
Aroclor-1260	2,900	1,000	**u**	1.0	**u**	1,000	**u**	1.0	**u**	1,000	**u**	1.0	**u**

Detections in bold

U: not detected at a concentration greater than or equal to the PQL

Table 17
Receptor Populations Exposure Pathways
Former Nike Missile Site W-92
Gaithersburg, Maryland

Medium	Receptor Population	Receptor Age	Exposure Route	Future Use-Recreational Selection or Exclusion of Exposure Pathway
Groundwater	Resident	Adult	Dermal Contact	Not Applicable
			Ingestion	
		Youth	Dermal Contact	
			Ingestion	
		Child	Dermal Contact	
			Ingestion	
	Construction Worker	Adult	Dermal Contact	No Remaining Impacts Identified
			Ingestion	
	Commercial Worker	Adult	Dermal Contact	
			Ingestion	
	Visitor	Adult	Dermal Contact	
			Ingestion	
		Youth	Dermal Contact	
			Ingestion	
		Child	Dermal Contact	
			Ingestion	
Soil	Resident	Adult	Dermal Contact	Not Applicable
			Ingestion	
		Youth	Dermal Contact	
			Ingestion	
		Child	Dermal Contact	
			Ingestion	
	Construction Worker	Adult	Dermal Contact	**Retained**
			Ingestion	
	Commercial Worker	Adult	Dermal Contact	
			Ingestion	
	Visitor	Adult	Dermal Contact	
			Ingestion	
		Youth	Dermal Contact	
			Ingestion	
		Child	Dermal Contact	
			Ingestion	
Vapor	Resident	Adult	Inhalation	Not Applicable
		Youth	Inhalation	
		Child	Inhalation	
	Construction Worker	Adult	Inhalation	Not Applicable
	Commercial Worker	Adult	Inhalation	**Retained**
	Visitor	Adult	Inhalation	
		Youth	Inhalation	
		Child	Inhalation	